

JPRS-CST-85-023

18 July 1985

# China Report

SCIENCE AND TECHNOLOGY

**FBIS**

FOREIGN BROADCAST INFORMATION SERVICE

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service, Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semi-monthly by the National Technical Information Service, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

18 July 1985

CHINA REPORT  
SCIENCE AND TECHNOLOGY

## CONTENTS

## PEOPLE'S REPUBLIC OF CHINA

## NATIONAL DEVELOPMENTS

Li Peng Attends Beijing Computer Industry Exhibit  
(XINHUA, 25 Jun 85)..... 1

Heilongjiang: Chen Lei on Scientific, Technological Reform  
(HEILONGJIANG RIBAO, 11 May 85)..... 2

Tianjin: Ni Zhifu Gives Technical Directive  
(TIANJIN RIBAO, 30 May 85)..... 15

Hebei: Zhang Shuguang's Speech on Science, Technology  
(HEBEI RIBAO, 17 May 85)..... 18

## Briefs

Integrated Circuit Assembly Line Operational 27  
National Computer Society Inaugurated 27  
Key Project Chemical Works 27  
Computer Technology Applications 27  
Increase in Technical Workers 28  
Technicians Sent to Borders 28  
Training Popular in Fujian 28  
Returned Students in Shanghai 29

## APPLIED SCIENCES

Nuclear Accident Protective Measures Outlined  
(Yao Jiaxing; ZHONGHUA FANGSHE YIXUE YU FANGHU ZAZHI  
[CHINESE JOURNAL OF RADIOLOGICAL MEDICINE AND  
PROTECTION], No 4, 25 Apr 84)..... 30

Chinese, Foreign High-Speed CMOS Products (Hao Hong'an; XIANDAI TONGXIN [COMMUNICATIONS TODAY], No 12, 8 Dec 84).....	49
---	----

#### ENVIRONMENTAL QUALITY

Guilin Working To Stop Pollution, Clean Environment (XINHUA, 23 Jun 85).....	55
---	----

#### Briefs

Lhasa's Low Air Pollution	56
New Use of Coal Dust	56
Shanghai Reports Antipollution Measures	56
Factories Make Antipollution Devices	57

#### SCIENTISTS AND SCIENTIFIC ORGANIZATIONS

#### Briefs

Electronics Institute To Move	58
Chinese Computer Society Inaugurated	58
Chinese Character Coding Meeting Held	58

#### ABSTRACTS

#### ACOUSTICS

HAIYANG YU HUZHDAO [OCEANOLOGIA ET LIMNOLOGIA SINICA], No 6, Nov 84.....	60
---	----

#### ATOMIC ENERGY

HE HUAXUE YU FANGSHE HUAXUE [JOURNAL OF NUCLEAR AND RADIO-CHEMISTRY], No 1, Feb 85.....	61
---	----

#### CHEMISTRY

LANZHOU DAXUE XUEBAO (ZIRAN KEXUE BAN) [JOURNAL OF LANZHOU UNIVERSITY (NATURAL SCIENCE EDITION)], No 2, 28 Jun 84.....	65
XIANDAI HUAGONG [MODERN CHEMICAL INDUSTRY], No 6, 20 Dec 84....	66

#### COMPUTER APPLICATIONS

SHUZHI JISUAN YU JISUANJI YINGYONG [JOURNAL OF NUMERICAL METHODS AND COMPUTER APPLICATIONS], No 3, Sep 84.....	67
SHUZHI JISUAN YU JISUANJI YINGYONG [JOURNAL ON NUMERICAL METHODS AND COMPUTER APPLICATIONS], No 4, Dec 84.....	68

COMPUTER DEVELOPMENT

JISUANJI YANJIU YU FAZHAN [COMPUTER RESEARCH AND DEVELOPMENT],  
No 11, Nov 84..... 71

ENGINEERING

SHUZHI JISUAN YU JISUANJI YINGYONG [JOURNAL ON NUMERICAL  
METHODS AND COMPUTER APPLICATIONS], No 3, Sep 84..... 72

ENVIRONMENTAL QUALITY

HUANJING KEXUE XUEBAO [ACTA SCIENTIAE CIRCUMSTANTIAE],  
No 1, Mar 85..... 73

ENVIRONMENTAL SCIENCES

ZHONGGUO HUANJING KEXUE [ENVIRONMENTAL SCIENCES IN CHINA],  
No 2, 21 Apr 85..... 74

FIBER OPTICS

LANZHOU DAXUE XUEBAO (ZIRAN KEXUE BAN) [JOURNAL OF LANZHOU  
UNIVERSITY (NATURAL SCIENCE EDITION)], No 2, 28 Jun 84..... 79

LASER

LANZHOU DAXUE XUEBAO (ZIRAN KEXUE BAN) [JOURNAL OF LANZHOU  
UNIVERSITY (NATURAL SCIENCE EDITION)], No 2, 28 Jun 84..... 81

ZHONGGUO JIGUANG [CHINESE JOURNAL OF LASERS], No 4, 20 Apr 85.. 82

WULI XUEBAO [ACTA PHYSICA SINICA], No 1, Jan 84..... 87

MATHEMATICS

LANZHOU DAXUE XUEBAO (ZIRAN KEXUE BAN) [JOURNAL OF LANZHOU  
UNIVERSITY (NATURAL SCIENCE EDITION)], No 2, 28 Jun 84..... 88

YINGYONG SHUXUE HE LIXUE [APPLIED MATHEMATICS AND MECHANICS],  
No 2, Feb 85..... 89

YINGYONG SHUXUE HE LIXUE [APPLIED MATHEMATICS AND MECHANICS],  
No 3, Mar 85..... 90

ZIDONGHUA XUEBAO [ACTA AUTOMATICA SINICA], No 1, Jan 85..... 91

MECHANICS

LIXUE XUEBAO [ACTA MECHANICA SINICA], No 6, Nov 84..... 92

LIXUE XUEBAO [ACTA MECHANICA SINICA], No 2, Mar 85.....	94
YINGYONG SHUXUE HE LIXUE [APPLIED MATHEMATICS AND MECHANICS], No 3, Mar 85.....	98
YINGYONG SHUXUE HE LIXUE [APPLIED MATHEMATICS AND MECHANICS], No 4, Apr 85.....	99
<b>MEDICINE</b>	
ZHONGHUA YUFANG YIXUE ZAZHI [CHINESE JOURNAL OF PREVENTIVE MEDICINE], No 5, 25 Sep 84.....	100
<b>MOLECULAR SCIENCE</b>	
FENZI KEXUE YU HUAXUE YANJIU [JOURNAL OF MOLECULAR SCIENCE], No 4, Dec 84.....	101
<b>NUMERICAL METHODS</b>	
SHUZHI JISUAN YU JISUANJI YINGYONG [JOURNAL ON NUMERICAL METHODS AND COMPUTER APPLICATIONS], No 3, Sep 84.....	102
<b>OPTICS</b>	
GUANGXUE XUEBAO [ACTA OPTICA SINICA], No 4, Apr 85.....	103
<b>PESTICIDES</b>	
HUANJING KEXUE XUEBAO [ACTA SCIENTIAE CIRCUMSTANTIAE], No 1, Mar 85.....	107
<b>PHYSICS</b>	
WULI XUEBAO [ACTA PHYSICA SINICA], No 1, Jan 84.....	108
TONGXIN XUEBAO [JOURNAL OF CHINA INSTITUTE OF COMMUNICATIONS], No 1, Jan 85.....	110
WULI [PHYSICS], No 2, Feb 85.....	114
HEJUBIAN YU Dengliziti WULI [NUCLEAR FUSION AND PLASMA PHYSICS], No 1, Mar 85.....	117
<b>PLASMA PHYSICS</b>	
HEJUBIAN YU Dengliziti WULI [NUCLEAR FUSION AND PLASMA PHYSICS], No 1, Mar 85.....	118

PSYCHIATRY

ZHONGHUA SHENJING JINGSHENKE ZAZHI [CHINESE JOURNAL OF  
NEUROLOGY AND PSYCHIATRY], No 2, 23 Apr 85..... 121

SURGERY

ZHONGHUA WAIKE ZAZHI [CHINESE JOURNAL OF SURGERY], No 2,  
Feb 85..... 123

NATIONAL DEVELOPMENTS

LI PENG ATTENDS BEIJING COMPUTER INDUSTRY EXHIBIT

OW251210 Beijing XINHUA in English 1156 GMT 25 Jun 85

[Text] Beijing, 25 June (XINHUA)--A major exhibition of computer technology, organized by the Ministry of Electronics Industry, opened at the Beijing exhibition center today.

On display for the next month are more than 500 computer products, including microcomputers, Chinese character computers, and computer-room facilities produced by 158 units all over China.

The exhibition includes demonstrations of the application of 110 computer schemes in enterprise management, medicine, agriculture, communications and scientific research.

Liu Jianfeng, vice minister of the Ministry of Electronics Industry, told reporters that China should improve its domestic ability in computer research and development and strengthen its computer industry, while at the same time cooperating with foreign computer firms.

China made important progress in computer production and application last year. The country produced more than 30,000 microcomputers last year, almost four times as much as in 1983, and about 10,000 computer schemes were now aiding businesses and authorities throughout China, compared with 100 in 1981.

The exhibition is also displaying software development, training, maintenance and other services. China has set up four corporations to develop computer information service--the China Computer System Engineering Corporation, the China Computer Technical Service Corporation, the China Software Technique Corporation and the China Computer-room Facility Development Corporation.

Technical seminars, consultancy and business talks will also be held during the exhibition, which was visited today by Vice Premier Li Peng and Electronics Industry Minister Li Tieying.

CSO: 4010/1006

NATIONAL DEVELOPMENTS

HEILONGJIANG: CHEN LEI ON SCIENTIFIC, TECHNOLOGICAL REFORM

SK040527 Harbin HEILONGJIANG RIBAO in Chinese 11 May 85 p 2

[*"Excerpts"* of Governor Chen Lei's report: "Reform the Scientific and Technological System and Make Science and Technology Serve the Economic Construction", delivered at the provincial scientific and technological work conference on 10 May 1985]

[Text] Now, I am going to give some opinions on the reform of the province's scientific and technological system.

1. Our province is confronted with a new situation of scientific and technological work.

Our province has made great achievements in scientific and technological work over the past few years. All fronts across the province have gradually turned to a path of linking the scientific and technological work with their production, thanks to conscientiously implementing the principle that "the economic construction must rely on science and technology and the scientific and technological work must be geared to the economic construction." A situation that the scientific and technological work is unprecedently enlivening has emerged. Some scientific and technological achievements have immediately been applied to production and remarkable economic results have been scored. The 11 measures for reforming the scientific and technological work, set forth at the provincial scientific and technological work conference last year, have been well implemented. The whole province has accumulated some experiences in the reform of the scientific and technological system. Some typical units in this regard have emerged. Over the past few years, the scientific research units and universities and colleges also established various forms of cooperative ties with production enterprises. Thus, lateral cooperations have been strengthened. A large number of scientific research and production integrated bodies have been set up across the province. In particular, the province has enhanced the cooperations between scientific research units, universities and colleges and small and medium-sized cities, township- and town-run enterprises, specialized households, and scientific and technological model households. The cooperations have brought advantages to the construction of key cities, the development of all undertakings in rural areas and the popularization and promotion of science and technology.

However, we must fully understand that along with the in-depth development of the urban and rural economic construction and the economic restructure centering on urban areas, our current tasks for the reform of the scientific and technological system are considerably arduous. Our current scientific and technological system cannot meet the requirements for the four modernizations relying on science and technology. The situation in which science and technology is divorced from the economy has not basically improved. The enterprises lack readiness to rely on science and technology and also lack an idea of making scientific and technological work serve the economy, and many scientific and technological personnel fail to carry out into full play their ability in creativeness and their initiative roles. The basic reasons for creating such conditions are that our current scientific and technological system basically follows a set of outdated and backward administrative and management methods to the neglect of the scientific and technological law and the economic law and the functions of the economic lever and market mechanism. So a series of malpractices were created as follows: First, most research organizations are taken on by the state. These organizations' funds are allocated, their tasks assigned by, and their achievements taken over by the state. They neither have decisionmaking power nor undertake any economic loads or responsibility. Second, the research organizations are divorced from the production departments. Most research institutes are independent of the enterprises while most enterprises' capability of first-line technological development is very weak. Third, the research organizations are generally subordinate to the departments and localities. So a situation in which the research organizations are owned by the departments, barriers between departments and regions at different levels exist, there are no mutual cooperations, the scientific and technological work that should be concentrated on are not, and no arrangements are made for division of work and cooperations has been formed. Fourth, the scientific research plan and the system of funds management are unreasonable and the scientific research plan and the economic plan are not related with each going its own way. Fifth, the scientific and technological personnel are assigned by the state and owned by the department, but cannot be exchanged. Their payments are not linked with their labor achievements. Knowledge is worthless. Their enthusiasm cannot be carried out into full play. We have urgently asked for a change in this situation for many years.

At present, the opportunity and conditions for reforming the scientific and technological system are ripe. The rural economy has begun to turn into a specialised, commodity and modern economy. Rural reform has aroused the peasants' urgent desire for science and technology, and an upsurge in developing the rural economy through science and technology is being created. It can be predicted that following further development in restructuring the urban and rural economy, all trades and professions will have increasingly greater needs for science and technology, and the great number of enterprises will also have more vigor in absorbing new technology and creating new productive forces. Such a trend has emerged in front of us. Governments and departments in charge of scientific and technological work and economic work should clearly understand the situation, make the best use of it in giving guidance, restructure science and technology and the economy simultaneously, and make new contributions to the province's new economic and social development.

The technical contract system should be implemented in those independent research organs which engage in technical development work and other research work that may yield practical value if put into application. Beginning this year, we should reduce year after year the scientific funds for such research organs in a step-by-step manner until such funds are no more allocated. Through reform, these research organs should be stimulated to become economically independent in 3 to 5 years. The plans on gradually reducing the operating funds year after year should be put forward by the various departments and should be examined and approved by the provincial Scientific and Technological Commission and the provincial Financial Department. The operating funds saved through the implementation of the technical contracting system should be used as scientific and technological development funds by the higher scientific and technological administrative departments to which they belong and such funds should still be used as scientific and technological investments. Units which engage in basic research and other research whose findings may be applied should implement the science funding system on a trial basis and in line with the state stipulations. The research organs which engage in social welfare undertakings and organs which engage in scientific and technical service and basic technical work will receive operating funds from the state and they should implement the budget contracting system.

Recently, the provincial CPC Committee held discussions and decided that the increase in the allocation of the province's scientific and technological operating funds should be greater than the increase in the regular financial revenue while the Seventh 5-Year Plan is being implemented. The amount of scientific and technological operating funds should be fixed in the provincial financial budgetary expenditure plan in line with this principle. The provincial Scientific and Technological Commission as well as the provincial Planning and Economic Commissions should formulate their scientific and technological development plan in accordance with such specific amounts. All cities and counties should also allocate scientific and technological funds in line with the abovementioned principle. Meanwhile we should formulate their scientific and technological funds in line with the abovementioned principle. Meanwhile, we should formulate relevant policies, and encourage departments, enterprises, and social institutes and organizations to invest in scientific and technological undertakings. Banks should vigorously issue scientific and technological loans and credit.

## 2) We should commercialize technical findings and actively develop technological markets.

This year, we should consider developing technological markets and commercializing scientific and technological achievements as a breakthrough in the scientific and technical reform and should score achievements in this regard. In addition to grasping the province's technological markets, all cities and counties should also vigorously create conditions, replenish strength, and expand facilities to invigorate their local technological markets in a step-by-step manner so that technological and trading networks with smooth channels will be formed across the province. Technological

## 2. On the Major Tasks and the Basic Demands of the Reform of the Scientific and Technological System.

The major content and orientation of the current reform is, starting from the operation mechanism, organizational structure, and the scientific and technical cadre management system, which restrict the scientific and technological system, to take the initiative in leading the objective economic law and the role of markets reflected by the socialist commodity economy to scientific and technological development, particularly to the sphere of scientific and technological development and management in order to instill new vigor and vitality into our province's science and technology. For this purpose, we should give prominence to major points and carry out the reforms in the following fields coordinatively.

1) We should reform the systems of planning and fund administration, and carry out the reforms in the following fields coordinatively.

In the field of the system of planning, we should greatly reduce the state's mandatory scientific research plans, and increase guidance ones. With regard to the small number of major projects of our province on tackling scientific and technical difficulties, technological development and technical transformation which have a bearing on the national economy and the people's livelihood, the province should make arrangements for them through mandatory plans. The scientific and technological committee and the committee for the planned economy should make coordinations for these projects, connect scientific and technological plans with economic and social development plans, make unified and coordinated arrangements for scientific research, follow production and operation, and gradually experiment with the management method of open invitation of bidding and contracts. With regard to the other large numbers of research and application projects, we should include them in guidance plans, issue such policy documents as "research guide" at regular intervals, and gear, with economic levers, scientific research work to the needs of society. In order to promote the coordination between science and technology on the one hand and the economy on the other, we should bear in mind the needs of rural areas and medium-sized and small enterprises, and place emphasis on a number of projects which can revitalize local economy, and yield quick and great results, and which need short construction periods. We should follow the principle of making unified arrangements and doing comprehensive research for trade, technology, industry and agriculture, and make coordination between scientific research and commodity production, and between development and comprehensive utilization of resources.

In the field of management of funds, we should allocate funds from local revenue for major scientific and technological research and development projects covered by the provincial plans. Funds for the projects which have better economic results and which can repay the funds should be repaid partly or totally, and this should be written down in contracts. Banks should be responsible for supervising the use of such funds and for recalling the amount which should be recalled. And should continue to use the recalled funds in new scientific research projects.

markets should focus their work on popularizing and applying domestic and foreign advanced technological finding and on promoting the integration of technology with production. We should further ease restrictive policies and adopt more flexible policies. The state, collective, and individual units should be encouraged to participate in this work. We should extensively organize technical consulting, technical contracting, technical transfer, technical service, and technical import activities as well as information exchange, bidding for difficult projects, and employment of competent personnel. Technological trading business should be carried out through various channels and forms. In order to create a better situation in the technological trade, we plan to organize a scientific and technological trade fair in the second half of this year. This trade fair will be headed by the provincial Planning and Economic Commissions with the participation of the relevant departments under the direct control of the province. Preparations will be carried out through the joint efforts of these commissions and departments.

The various scientific and technological development and exchange organs such as the technological markets should be managed as enterprises. But these kinds of organs should not just pursue their own profits, nor should they consider this as their main purpose. It is proper and reasonable for the mediate parties to charge a certain amount of management funds from the scientific and technological development, exchange, and managing activities. Preferential policies should be implemented in the technological markets in terms of their prices and taxes. We should boost the enthusiasm of the buyers, sellers, and mediators and protect their legal rights and interests. As for profit sharing and distribution, we should properly handle relations among the state, the collective, and individuals.

3) We should achieve lateral cooperation and enhance enterprises' ability to absorb and develop technology.

First, research units and universities and colleges engaged in technological development should readjust the emphasis of their research work in accordance with the principle of serving economic construction and develop various forms of cooperation and coordination with production departments, inline with the principle of voluntary participation and mutual benefit so as to make themselves become an important force in developing new products and new technology for enterprises. On the basis of conducting coordination, some scientific research organizations may emerge with enterprises and become departments in charge of technological development under the jurisdiction of the enterprises; and the enterprises may emerge with the research organizations and become workshops for manufacturing new products on a trial basis under the jurisdiction of the research organizations. On the basis of conducting coordination, some may develop into enterprises engaged in both scientific research work and businesses and organizations in charge of technological development under the jurisdiction of small and medium-sized enterprises. Scientific and technological departments and the departments in charge of the economic work should formulate some specific measures for

for enthusiastically guiding and promoting the sound development of coordination between enterprises and scientific research organizations.

Second, while fully relying on the scientific and technological force of society, enterprises should enthusiastically enhance their own capability in technological development. Large and medium-sized key enterprises with a strong capability in technological development and small and medium-sized enterprises with favorable conditions are allowed to transfer a certain amount of production capacity to and concentrate a certain amount of technological capability on the development of new technology, and to set up and perfect departments in charge of technological development to gradually turn the enterprises' work emphasis from production and management to development. Besides, large and medium-sized enterprises should set up a number of technological development centers to serve the technological development of both their own plants and their trade so that some large and medium-sized enterprises will expand their technological advantages into small and medium-sized ones and help them conduct technological development work. Simultaneously, some scientific research units at the provincial and city levels may gradually be transformed into trade technological development centers. In order to rapidly conduct this work, this year we should organize and set up a number of technological development centers among machinery, metallurgical, petrochemical, electronic, textile, medical, building materials, light industrial, and No 2 light industrial departments. We may gradually expand the establishment of technological development centers if we need more in the future.

Third, we should enthusiastically open up channels for increasing enterprises' funds for technological development. This is an important factor for upgrading enterprises' capacity and technological development. Not long ago, the provincial government issued "provisional regulations on enhancing the vitality of large and medium-sized enterprises." The regulations stipulated a series of correct policies and measures. All localities should conscientiously implement them. Enterprises may adopt various channels for making the most of bank loans so as to "make money by using borrowed money." Simultaneously, localities, departments, and enterprises are allowed to extend loans and make investments in each other. Enterprises are allowed to issue shares to the staff and workers, and those who, share stocks may share bonuses. In order to accelerate the upgrading and updating of products and to improve enterprises' competitiveness, the provincial government decided to allocate 3 million yuan of funds for extending loans with discount interests every year and to prepare for building bases for developing new products so as to enhance enterprises' capacity of absorbing and developing technology.

4) We should grant more decisionmaking powers to scientific research institutes, and comprehensively practice the system of directors assuming overall responsibility.

We should popularize the system under directors assuming overall responsibility in a comprehensive and step-by-step manner, and strive to organically combine duties with powers and interests and make them dependent on one another. Directors of research institutes should be given full powers to be responsible to higher authorities. Directors of research institutes should be appointed or employed by higher authorities, and a fixed period of employment should be given. Deputy directors of research institutes should be appointed or employed by higher authorities, and a fixed period of employment should be given. Deputy directors of research institutes should be nominated by directors, and then be reported to higher authorities for approval. Directors of scientific research institutes may, within the limits prescribed by state laws and decrees, decide on their planning, funding, personnel management, production, operations, organizational structure, and other major work. Research institutes should set up their academic committees, and establish and improve the democratic management system. In particular, more powers should be granted to heads of research job units. Members of research job units may be employed by unit heads or may be organized freely.

Research institutes must establish scientific research responsibility systems, and focus their work on scientific research programs. Independent research institutes should voluntarily conduct scientific research and operational activities and cooperate with others within the limits prescribed by state laws and decrees and on the premise of fulfilling state-assigned tasks in order to strengthen their research capacity through competition.

In granting autonomy to research institutes and instilling vitality into such institutes, all responsible departments should set an example in rapidly transferring due powers to lower-level units in line with the principle of separating government administration from scientific research. All responsible departments should actually orient their functions and powers towards drawing up plans, giving guidance to reform, organizing major research programs, providing scientific research information, ensuring the conditions for scientific research, and conducting supervision and inspections. In particular, they should be meticulous in selecting and appointing the responsible persons of party organizations of research institutes and selecting directors of such institutes. Through ideological and political work, party organizations of research institutes should ensure and supervise the implementation of all party principles and policies, support the effectiveness of the system of directors assuming overall responsibility, and promote the development of scientific and technological work.

5) We should keep abreast of the readjustment of the rural industrial structure, and reform the agricultural scientific and technological system.

In reforming the agricultural scientific and technological system, the focus should be placed on opening more channels to transmit technologies, competent persons, and information to rural areas in order to be conducive to the readjustment of the rural economic structure and to serve the transformation of agricultural technology and the overall construction of rural areas. The rural scientific and technological popularization and service system should be reformed in line with the construction of commodity production

bases. Many cities and counties in the province have merged their original agricultural scientific research stations, agricultural technological popularization stations, and agricultural technological organs into agricultural technology popularization centers which exercise unified leadership over experiments, popularization, and training work. This is conducive to applying various agricultural technologies to production, and marked achievements have already been scored. All cities and counties should, proceeding from reality, establish and improve such multipurpose technological service centers; strive to render good technological services in the fields of supply, production, storage, transport and processing; and attend to the popularization of new technologies. Townships and villages should also establish their technology popularization and service organizations in order to gradually form an agricultural technology popularization and service network with state scientists and technicians as the key link and with peasant technicians as the dominant part.

Specialized, key, and model scientific and technological households are a link coordinating scientific research and production through setting examples, application, and operation, and a new force actively working on the frontline of production. Pertinent departments at all levels should energetically assist and support them. Localities where conditions permit should guide peasants in running individual or joint service units for developing and popularizing science and technology, and successfully run the various science and technology application association and research institutes of peasants. Research institutes run by peasants and their research results should be supported by all fields of society. All localities should vigorously cooperate with scientific research units, colleges, and universities, and industrial and mining enterprises with the end of building commodity production bases, organize various forms of associations on the principle of voluntary participation and mutual benefit, bring in technology and talented people from outside to develop certain resources or certain products characteristic in certain areas of trades which are provided with advantages for development, and to develop fine processing of farm and sideline products, and make rural technology trade fairs more brisk. We should greatly explore the intellectual sources of rural areas; develop a series of applicable multipurpose coordinated technologies; and improve the scientific and technological, and operation, and management levels of agricultural modernization. In the future, we should not focus our attention on the crop industry alone when trying to improve the technical level of peasants. We should also pay particular attention to improving peasants' technical skills in breeding, processing, engineering, machinery, as well as storage and services, and widely apply modern science and technology to farming, forestry, animal husbandry, poultry breeding, fisheries, sideline production, and industry.

6) We should reform the scientific and technical cadre management system, and give full play to the role of scientific and technical personnel.

As far as the system of managing scientific and technical cadres is concerned, we should change the situation in which talented people cannot be rationally transferred, mental labor is not duly respected, and the enthusiasm and initiative of intellectuals have not fully developed. We should make a

breakthrough in the employment system, and begin with solving the problem in the rational transfer of talented people to promote the reforms in other fields.

First, we should uphold the rational transfer of talented people. The transfer of scientific and technical personnel should be carried out in a well-organized and planned manner on the principle of rationalizing intellectual structure and serving needs. Scientific and technical personnel should be encouraged to transfer to areas and units where talented people are urgently needed. Units where there are too many talented people should urge surplus talented people to transfer to posts here they can play a better role, in particular, to the remote and poverty-ridden areas where there is an acute shortage of talented people. We may stipulate a certain work period for those who are transferred, allow them to return to their original work areas when the work period expires, and make proper arrangements for them.

Second, all units, particularly higher educational institutes, research and designing units, and large enterprises where scientific and technical personnel are concentrated, should gradually enforce the system of a fixed number of organizations and employees and fixed quotas of work, and transfer to other areas above-quota scientific and technical personnel. Scientific and designing units where middle-aged scientific and technical personnel are over concentrated should adopt the method of replacement according to a certain proportion. A certain number of college and university graduates should be distributed to these units in a planned manner and, at the same time, some middle-aged backbone scientific and technical personnel of these units should be transferred to units whose scientific and technical force is weak to develop their talents so that the situation in which scientific and technical personnel "become old at the same pace" can be changed.

Third, scientific research and designing units and higher educational institutes where conditions permit should gradually experiment with the scientific and technical personnel employment system, and make proper arrangements for above-quota personnel after the system of employment of a fixed number of employees is implemented. All localities and departments should select various types of units for the experiment. Scientific and technical personnel should be allowed to resign under certain conditions, but they should get the approval of competent departments.

Fourth, scientific and technical personnel should be allowed to moonlight and get proper pay under the condition that the economic and technical rights and benefits of the state and the collective are not infringed upon. This is an effective way of promoting transfer of intellectual sources, and should be organized and guided in a planned manner.

3. We should seek unity of thinking and carefully give instructions to ensure a sound development of reform.

Just like reform of the economic structure, reform of the scientific and technological system is a revolutionary change in the current system and

the greatest and basic change. Reform of the scientific and technological system is not only related to all links in the scientific and technological field, but also affects and conditions all fields of social activities, including economic, educational, and cultural work. We must seek unity of thinking, upgrade our understanding, and carefully give instructions.

First, we should have a unified understanding of the ideology for guiding the reforms.

We should correctly foster three basic ideas. First, our aim in scientific and technological reform is to basically change the abnormal state of science and technology being divorced from production, and set up a new system of closely linking science and technology with production. In the whole course of reform, we should implement the strategic principle of "relying on science and technology to conduct economic construction and making scientific and technological work serve economic construction." Second, the new scientific and technological system must suit our country's planned commodity economy. The new scientific and technological system should be a system conducive to economic development. Therefore, we should respect the law of scientific development, apply economic levers, and pay attention to the law of value. Third, in line with actual conditions, we should comprehensively and creatively implement the central authority's "Decision" and reform the current scientific and technological system in a resolute and step-by-step manner.

Second, we should have a unified understanding of the aim of reforms.

Reform of the scientific and technological system is aimed at widely applying scientific and technological achievements to production; carrying into full play the functions of scientific and technological personnel; vigorously liberating the scientific and technological productive force; promoting a further combination of science, technology, and production; and promoting a coordinated economic and social development. Conducting scientific and technological reform does not mean to set up irrelevant "briefcase companies" nor to establish so-called "centers." The only way to appraise and examine the results of reform is to see whether or not we have liberated scientific and technological productive forces.

Third, we should have a unified understanding of the motive power of reforms.

The income of many cadres and scientific and technological personnel in our province slightly increased in the past few years. Some of them have difficulties in their livelihood due to heavy family burdens. However, they are still devoted to their duty, enthusiastically do their work, and make contributions to socialist modernization. Their lofty idea and practice of wholeheartedly serving the people is commendable. Leaders of some units do not rely on the socialist enthusiasm and initiative spirit of the broad masses of scientific and technological personnel, but organize forces to conduct reforms in line with the central authority's principles and

policies. They only stress material incentives. These people forget the great goal, only paying attention to the gains and losses of small units. They do everything to make money. A tendency to do everything to gain bonuses existed for a period of time. Units that gave more bonuses to scientific and technological personnel were regarded as ones that had made more achievements in reforms. Under the guidance of this idea, they arbitrarily issued bonuses and materials, practiced fraud, appropriated public property, and sought private gains at public expense. They are not main trends but a symptom of unhealthy tendencies. We should pay attention to them. If we do not give correct guidance or let them go unchecked, we will take to evil ways and forfeit the future of reforms. Comrade Deng Xiaoping's speech at the national scientific and technological work conference reminded us that we should never neglect education on ideals and discipline.

It was because we had Marxist beliefs, communist ideals, and a disciplinary guarantee to realize such beliefs and ideals that we conquered untold hardships and won victory in the revolution in the past. Today, when we want to carry out reform successfully and build characteristically Chinese socialism, we should also have ideals and discipline. With ideals, we will have prolonged impetus to carry out reform successfully, and with discipline, we can march in step and be invincible. Clearly understanding this has an important immediate significance in guiding both reform in the economic structure and reform in the scientific and technological structure.

Fourth, we should unify our understanding of the steps and methods of reform.

Science and technology are a comparatively complicated matter. Even if we have clarified the orientation of major issues, we should still be very prudent in adopting specific steps. For a very long period in the past, we used to resort to the method of "stirring up a wind" and "launching a movement" because of the influence of "leftist" ideas. The result was often contrary to our wishes, turning what was originally correct into something wrong, and turning policies which originally were not very perfect into disasters. These lessons should not be forgotten. When we are dealing with issues of fundamental importance, such as reform of systems, we should never rush headlong into mass action and seek uniformity, still less pursue unrealistic "high growth rate" and quick results. We should be both steadfast and prudent, and strive to achieve actual results. With regard to the problems arising in the course of reform, we should analyze them and make the best use of the situation to give guidance instead of making a fuss over them so that problems can be solved in a timely manner.

Fifth, we should draw a clear demarcation line, and correctly handle the relationship between new unhealthy trends and reform.

At present, there are two tendencies detrimental to reform and to our correction of new unhealthy trends. The first is that some units or persons are taking advantage of reform to vigorously engage in unhealthy trends under the guise of opening to the outside world and enlivening the domestic economy, and to damage reform. The second is that lacking the ability to distinguish dishonest practices from the mistakes in reform, some departments

are pouring cold water on reform. Our efforts to correct unhealthy trends are compatible with those to carry out reform. They do not mean to take the road of retrogression, but mean to remove obstacles to ensure the smooth progress of reform. At present, the key to solving this problem is to enhance understanding and clarify the bounds of some policies. The most important is to distinguish correct implementation of the principle of distribution according to work and awarding scientific and technical personnel who have contributed according to relevant stipulations from the arbitrary issue of bonuses and materials; distinguish proper ways to create necessary living and work conditions for scientific and technical personnel and to solve the actual difficulties of the masses from the pursuit of selfish interests for individuals and small groups at the expense of the interests of the state and the people; distinguish reasonable payment earned by giving effective technical services through proper channels in spare time without adversely influencing one's own work from the pursuit of extra income and selfish interests; distinguish paid transfer of personal inventions and creation and technical achievements from encroachment of collective technical rights and benefit and economic interests; distinguish the various preferential provisions granted to scientific and technical personnel from the high earnings and material benefits aiming at absorbing these personnel; and distinguish the various forms of technical and trade activities that scientific research units carry out in order to turn themselves from pure research units into research-business units, open up technology markets, and accelerate the application of their research achievements from abandonment of research to engage in business in violation of state stipulations in order to earn great profits. Giving clear boundaries in these aspects is very important to removing misgivings, and to encouraging scientists and technicians to boldly carry out reforms. Our principles are to firmly and unswervingly carry on reform and resolutely check new unhealthy trends. Those who have committed errors in carrying out reforms due to lack of experience should be helped to sum up experience and lessons, and should be guided to carry out reforms correctly.

Sixth, we should streamline administration, delegate powers to lower levels, and strengthen leadership.

In the past, we have exercised excessive and rigid control over the scientific and technological work. But, we also failed to control the overall development of work because we did not concentrate on work on which we should concentrate. Therefore, we should exercise effective control over major issues while allowing flexibility on minor ones. Scientific and technological commissions at all levels should pay attention to the major issues and the overall situation and should, in particular, attach importance to studying and analyzing the trend of scientific and technological development and social need in order to draw up proper strategic policies for developing scientific and technological work. Scientific and technological commissions should also act as a multipurpose department in order to help CPC committees and people's governments to develop scientific and technological work.

Reform of the scientific and technological system is by no means the affair of scientific and technological departments alone, but is a common task of the scientific and technological circle, all educational departments, all enterprises, and all pertinent departments. Scientific and technological commissions, planning and economic commissions, financial and banking departments, and other pertinent departments should make concerted efforts to establish necessary consultation systems; communicate their ideas with one another in a timely manner; coordinatedly map out principles, policies, and plans; and strive to rationalize the relationship between scientific and technological work and economic work and between departments and regions at different levels.

Implementing the CPC Central Committee's decision on reforming the scientific and technological system, and achieving success in reforming the scientific and technological system are a major event of the entire party. In order to strengthen unified leadership over the reform of the scientific and technological system, the provincial CPC Committee and the provincial people's government have decided to set up a scientific and technological leading group to organize forces in all fields to promote reform of the scientific and technological system and the development of the scientific and technological work. CPC committees and people's governments at all levels should list this work as an important item on their daily agenda, combine these two "decisions," and simultaneously attend to the economic structure reform and reform of the scientific and technological system.

Let us make concerted efforts to win victory in the reform of the scientific and technological reform and to vigorously develop the province's economy.

CSO: 4008/2006

NATIONAL DEVELOPMENTS

TIANJIN: NI ZHIFU GIVES TECHNICAL DIRECTIVE

SK190447 Tianjin TIANJIN RIBAO in Chinese 30 May 85 p 1

[Text] "Tianjin Municipality, an industrial base, while introducing advanced foreign technology, should strengthen the ('three-basis') [parenthesis as published] technical renovations of basic industrial link, continuously reinforce the capability of industrial self-improvement and self-development, and should also provide advanced complete sets of equipment in addition to elegant daily necessities in order to make due contributions to promoting industrial development throughout the country." This is the opinion put forward by Ni Zhifu, secretary of the municipal CPC Committee, in guiding investigation and study over the basic municipal industries.

Since March this year, under the guidance of Ni Zhifu, the departments concerned of the municipal CPC Committee and the municipal People's Government have carried out investigation and study over the current situation and development principle of the basic municipal industrial link of ('three-basis'--basic devices, basic materials, and basic technology, including personnel training) [parenthesis as published] and have provided scientific basis for the formulation of the Seventh 5-Year Plan by better mapping out the strategy of economic and technical development throughout the municipality. Joining the investigation and study work were Yang Jingheng and Liu Zengkun, Standing Committee members of the municipal CPC Committee.

Ni Zhifu attached great importance to the investigation. Recently, he invited Shen Hong, member of the Scientific Council of the Academy of Sciences of China and a nationally noted veteran machinebuilding industrial engineer, to come to Tianjin on a special trip to conduct guidance over the investigation and study. Over the past few days, Ni Zhifu and Shen Hong went deep into some plants and institutes concerned to carry out investigation and studies and to hold discussions on the strategic issue of economic and technical development throughout the municipality with the comrades from the general office under the municipal CPC Committee, the scientific and technical department under the municipal CPC Committee, the municipal Planning Commission, the municipal Economic Commission, the municipal Scientific and Technological Commission, and from a number of bureaus and companies. Ni Zhifu gave important opinions to the forum.

Ni Zhifu stated: The recent approval of the 3d session of the 10th municipal People's Congress on the overall plan of the municipality has enabled the people throughout the municipality to have a clear outline of the beautiful future of the municipal development. All of us have been inspired and are determined to vigorously build Tianjin gradually into an economic center and an international harbor city with advanced technology, developed industries, prosperous culture, and brisk commerce. Our future work is to orient the ideal and desire of the people throughout the municipality into practical action. Efforts should be made to further implement the designation of building Tianjin into an economic center and an international harbor city, which consists of "one base" and "five centers"--a comprehensive industrial base with advanced technology and open and multiple-function centers of communications, trade, finance, information, and scientific education. This urges us to carry out deep studies on the tasks of the designation one by one in order to gradually implement them in an overall way.

He stated: In carrying out our studies, we have started our work on the issue of building an "industrial base." the investigation currently carried out over basic industries is aimed at, proceeding from reality, finding out what function that the municipality, an "industrial base," should perform and what role the municipality should play in the country. This is an important issue of how we can strengthen our capability of self-improvement and self-development. Our country, as big as it is, cannot fulfill the four-modernization program by relying on foreign exchanges. Economic development, in the final analysis, must be based on self-reliance. Of course, it is necessary for us to introduce a number of advanced technology, key equipment, and the production line of high-grade daily necessities in order to enable them to play an exemplary and promoting role in making technical progress among the old enterprises. However, by no means should we fall into blindness, prevent from the practice of rushing headline into mass action, and avoid the emergence of the following three problems: 1. Avoid conducting introduction blindly or duplicatedly. 2. Avoid relaxing one's efforts to absorb or assimilate imported technology. 3. Avoid starting a project with low standards. If we fail to successfully assemble the imported parts to complete the sets of production line, such a failure would become the bottomless pit of consuming foreign exchanges and would also become the high output value and "economic returns" that are exchanged by the high volume of foreign exchanges. Over the past few years, Tianjin Municipality has done a better job in conducting introduction and scored marked achievements in this regard. However, the municipality still has to review or sum up its work in line with the three problems mentioned above. Following this way will be favorable for the municipality to map out the "Seventh 5-Year Plan".

He pointed out: Judging from the situation of the municipality and the country, the current task we face is to attach special importance to the work of absorbing or assimilating imported technology. It urges us to conduct earnest organizing and planning and to organize scientific research, designation, higher education institutions, and enterprise capability to make concerted efforts to set up coordinative systems in the work. The work

of "absorbing or assimilating imported technology" comprises the following two tasks: 1. Efforts should be made to step up the home production of parts forming complete sets of products and to turn out domestically as soon as possible the bulk parts and raw materials instead of the imported ones. 2. Efforts should be made to accelerate the pace of absorbing or mastering the designing methods and new technical theories of products; and the designing or manufacturing technology of advanced technological process and technical equipment. We should achieve total assimilation of imported technology through conducting study, application, transformation, and creation. By doing so we will be able to make use of the one or two imported production lines and key equipment to turn out more and better new production lines and the complete sets of equipment in order to upgrade the quality of ours. To this end, we must strengthen our work in building or developing the "three-basis" program and exert all-out efforts to do some things in line with the several industrial basic links.

Ni Zhifu emphatically pointed out: As for the construction of the "three-basis" program with strong social effect but weak economic results, we should take into consideration some special policies on giving priority to conducting technical renovations among the large number of basic links of the municipal industries in order to arm them with new technology and to enable us to obtain greater initiative in carrying out the arduous task of conducting overall reforms among the 4,400 enterprises throughout the municipality, as well as to enable the development of newly-developed industries to be based on a dependable foundation. Therefore, strengthening the construction of the "three-basis" program is a basic condition for achieving steady and stable development among the municipal industries. He urged the departments concerned under the municipal CPC Committee and the municipal People's Government to further organize all forces to carry out investigation and study among the municipal basic industries, to clearly discern the municipal situation, to further define their work direction, and to unify their understanding and steps. Efforts should be made to integrate their investigation and study with the work of formulating the "Seventh 5-Year Plan" and to link their investigation and study with the programs of conducting reforms among economic systems, readjusting industrial and product structures, and carrying out technical renovations among the old enterprises.

CSO: 4008/2006

NATIONAL DEVELOPMENTS

HEBEI: ZHANG SHUGUANG'S SPEECH ON SCIENCE, TECHNOLOGY

SK181330 Shijiazhuang HEBEI RIBAO in Chinese 17 May 85 pp 1-2

[Speech of Zhang Shuguang, deputy secretary of the Hebei Provincial CPC Committee and governor of the province, given at the provincial scientific and technological work conference on 13 May 1985]

[Excerpts] The major purpose of this provincial scientific and technological work conference is to discuss ways to study the CPC Central Committee's decision on reform of the scientific and technological structure and ways to implement the guidelines of the national scientific and technological work conference, and to work out specific measures for the province's scientific and technological reform in order to promote the province's economic development. In order to make this conference successful, the Standing Committee of the provincial CPC Committee and the party leading group of the provincial government held discussions on four occasions, and entrusted the Scientific and Technological Committee, the economic committee, and other relevant departments to conduct investigations and study and to draw up documents for the conference. We also issued six interim regulations or experimental measures for the conference to discuss and revise. The conference continued for 3 days during which the "Decision" and the speeches of the central leading comrades were studied. Yesterday, we again heard reports of eight comrades on their experiences. All this was conductive to our understanding and implementation of the CPC Central Committee's decision.

Since the national scientific conference, in particular over the past 2 years, a good trend of vigorous development has emerged in our province's scientific and technological front. The Marxist thesis that science and technology are productive forces and that intellectuals are a component part of the working class put forward by Comrade Xiaoping at the national scientific conference has been gradually understood by the masses of party members and cadres, and has taken deep root in the hearts of the people. The common practice of respecting knowledge, science, and talented people is being established. Thanks to our implementation of the CPC Central Committee's strategic principle of "relying on science and technology in developing economic construction and gearing science and technology to the needs of economic construction," we have integrated science and technology with the economy, and have developed them. We have probed into the reform of science and technology in some fields, and have achieved remarkable results.

Through readjustment and consolidation of independent scientific research units, we have preliminarily solved the problems of organizational overlapping, dispersing personnel, and irrational distribution. The contract system on technology and research jobs has been introduced to the research institutes engaged in technology development and application, thus expanding their autonomy, arousing the initiative of research units and scientific and technical personnel, and creating a good trend in which more research results are achieved and are geared to social needs, and income is increased. Last year, the number of scientific research and technical service projects undertaken by research institutes doubled that of 1983, and the number of scientific research results increased by 44 percent. As the income from technical services increased, some institutes became basically independent economically. Following the in-depth implementation of the policies of reform, opening to the outside world, and enlivening the domestic economy, the commodity economy developed rapidly in urban and rural areas, technology fairs increased fairly quickly, and fairly good social economic results were achieved. Since last year, the province has sponsored more than 1,000 technology trade fairs, held sales exhibitions for more than 20,000 technological results and technological information, imported and employed more than 15,000 scientific and technical personnel of various specialities, established some 1,700 scientific research and production associations, imported some 4,500 technological results, and increased its profit and tax by more than 400 million yuan through the application of the technological results. The "wagon" of the provincial scientific and technological information institute has visited more than 30 counties to deliver technological results and information to township enterprises and peasants. It enjoys great popularity among the masses. In rural areas, the old system of developing science and technology through the efforts of the state alone has been changed, and the system of relying on the forces of whole society--the state, the collective and the individual--to develop science and technology has been enforced, thus promoting the commodity economy in rural areas.

As our refo.s is only in its initial form, the defect of science and technology being divorced from the economy in the current scientific and technological system has not been eliminated, and the function of science and technology as the most vigorous decisive factor in social productive forces has not been fully realized. Major manifestations are as follows: The first is the over-centralized and excessively rigid control of the state through administrative measures in terms of the operation mechanism. Because of a long-term failure to use economic levers and market regulation, research institutes are eating from the common big pot of the state, and individuals are eating from that of the institutes. As a result, research institutes lack the ability to develop themselves and to serve economic construction. The second, in terms of organizational structure, is the separation of research institutes from enterprises; the dislocation of research, designing, education, and production; and the barrier between the army and the civilian, and between different departments and regions. As a result, the channels through which science and technology flow to production units are blocked. The third is that too many restrictions are imposed on scientific and technical personnel, in terms of the personnel system.

Stationed in certain departments or regions, competent personnel cannot be transferred rationally. Mental labor is not duly respected. The above-mentioned defects are detrimental to gearing science and technology to the needs of economic construction and rapidly transforming scientific and technological results into productive forces, hamper the utilization of the wisdom and creative ability of scientific and technical personnel, and make scientific and technological development incompatible with the new situation. Therefore, our tasks for reform are heavy and arduous.

I will speak on four issues with regard to how to proceed from the reality of our province in conscientiously implementing the CPC Central Committee's decision and in greatly promoting our province's reform of the scientific and technological structure.

1. We should fully estimate the necessity and urgency of the reform of the scientific and technological structure.

At present, the matter of prime importance is ideological understanding. The first need is to enhance our understanding of the important position and function of science and technology in economic construction, and to heighten our awareness in the reform of science and technology. The second need is to see the long-term influence and fetters of the old systems and ideas, and the severe ill consequences of the defects of the old scientific and technological system imposed on economic development in order to enhance our sense of urgency in reforming science and technology. After this, we should unify our thinking and action in line with the CPC Central Committee's decision, be promoters of the reform, and carry it out vigorously and steadily.

The reform of the scientific and technological structure which we are carrying out is closely bound up with our efforts to revitalize the economy, to make the country strong and the people wealthy, and to accomplish the four modernizations. Science and technology are needed by large key enterprises and small and medium enterprises in cities, by township enterprises, and by rural areas in developing the commodity economy. In such a new situation, science and technology should serve economic construction better, and be closely linked with the economy. Where should science and technology be combined with the economy? They should be combined at enterprises, at production units. However, a very serious defect of the current scientific and technological system is precisely the separation of the relations between science and technology on the one hand and the economy on the other, and the blockage of the channels through which science and technology reach society and serve production. Comrade Xiaoping told us explicitly: "The reforms in the economic structure and in the scientific and technological structure are aimed at emancipating the productive forces. The new economic structure must be one conducive to technical progress, and the new scientific and technological structure must be one conducive to economic development. With the reforms in these two fields carried out simultaneously, the long-term separation of science and technology from the economy will possibly be resolved fairly successfully." Comrade Ziyang

said: "The scientific and technological structure must be reformed in order to carry out the four modernizations more successfully and to usher in the new technological revolution. And "It is time to include the reform in science and technology in our agenda. If this is delayed, we will bungle things." Our leading comrades at various levels, and comrades in scientific and technological, educational, economic, and other trades should follow the instructions of the central leading comrades, and conscientiously carry out reform of science and technology while restructuring the economy.

## 2. We should clarify the guiding ideology and the purpose of reform.

Reform of the scientific and technological structure is a complicated and arduous task, one of large-scale systems engineering. The decision of the CPC Central Committee points out: "The fundamental purpose of the reform of science and technology is to rapidly and widely apply scientific and technological results to production, to enable scientific and technical personnel to fully play their role, to greatly emancipate scientific and technical productive forces, and to promote economic and social development." Comrade Yaogang pointed out vividly that reforming the scientific and technological system means mobilizing thousands upon thousands of people to go up the mountains to pick peaches. This is the guiding ideology and the fundamental purpose of our reform. The masses of our scientific and technical personnel are representatives of advanced productive forces. They have made significant contributions to socialist construction during the past 35 years. In the future modernization drive, they are still pioneers of new productive forces. Reform of the scientific and technological system means exactly to fully develop their wisdom and creative ability, achieve more results, apply achievements to production, and promote economic development. In evaluating the results of the reform and deciding whether it is successful, the most fundamental criterion is to see whether this purpose is achieved.

## 3. We should give prominence to major points, and greatly advance the scientific and technological reform of the province.

The nine issues mentioned in the CPC Central Committee's decision on reform of the scientific and technological structure are very important and should be carried out comprehensively. At present, we should focus on the theme of integrating science and technology with the economy and promoting provincial economic development, and emphasize the reforms in the following five areas.

### 1) We should reform the system of allocating funds to research organs, and expand the autonomy of research institutes.

The main force of developing science and technology and improving the scientific research level is independent scientific research organs at various levels. The key to enlivening research institutes and promoting the integration of scientific research with production lies in changing the fund allocation system, giving greater autonomy to the institutes, solving the problems in the relations of the research institutes to the state and those of individuals to the research institutes by means of economic levers and market regulation, changing the old method of exercising management through administrative measures alone, overcoming the defect of over-centralization and excessively rigid control by the state, breaking with the barriers between regions and departments, and enabling research institutes to improve their

ability to develop themselves and to gain more vigor in voluntarily serving economic construction.

We should simplify administration and decentralize power to lower levels, gradually separate government functions from those of the research institutes, and improve government departments' macroeconomic management of research institutes. Competent departments at various levels should grant full autonomy to their subordinate research institutes, allowing them to make their own decisions, within the framework of the stipulations of state laws and decrees, in the areas of the formulation of plans, utilization of funds, management of personnel, establishment of organs, transfer of results, and distribution of bonuses, except for the research jobs assigned by the state, and the appointment or employment of directors by higher authorities. Research institutes may readjust their research orientation and tasks according to the needs of the state, and of trades, enterprises and the market, and in line with their own conditions and characteristics. They have the right to set up scientific research and production associations with other units, to develop themselves into enterprises engaged in scientific research, or to become technological development centers of their own trades. They have the right to use or hire necessary personnel, and to sign lateral cooperation contracts with other units in order to obtain more scientific and technological development funds through various channels on the premise that the tasks assigned by higher authorities are fulfilled. The net income of research institutes will not be delivered to the state, but will be used as a scientific and technological development fund, collective welfare fund, award fund and director's fund. The net income used as scientific and technological development fund should amount to more than 50 percent, and that used for other purposes should also be properly proportioned.

Government departments should work in line with the major economic management functions of government organs as stipulated in the "CPC Central Committee's Decision on Reform of the Economic Structure," support the reform of research institutes, and avoid interfering in their scientific and technological activities. Scientific institutes of various specialities under the province should also simplify administration and decentralize power to lower levels, streamline their organs, reduce their staff, and replenish their personnel engaged in actual research work in order to change the situation in which personnel in higher levels are charged with excessive duties and tend to take over everything, and to open and enliven research institutes in a down-to-earth manner.

2) We should exert great efforts to open up technological markets, and enable technological results to become commodities and be used in production.

Opening technological markets is an important policy decision stated in the CPC Central Committee's decision on reform of the economic structure, and also an important measure to promote the integration of science and technology with the economy. The general requirement is to make it open and flourish.

We should change the method of transferring technological results through administrative means without any payments, and foster the idea that technology is a commodity which has its value. At the national scientific and technological work conference, Comrade Ziyang pointed out: "In order to gear scientific research to the needs of production, we should acknowledge the value created by mental labor, and should allow the overwhelming majority of technological results to become commodities." The CPC Central Committee's decision on reform of the scientific and technological structure states: "Along with the development of science and technology, technology is playing a bigger and bigger role in creating society's commercial values. More and more technologies have become independently existing commodities in the form of knowledge, and a new knowledge industry has appeared." Opening technological markets to make technological results enter the sphere of circulation as commodities is not only an important reform in the operation of scientific and technological organs, but also an inexorable trend and law of socialist economic development. We should actively enable technological commodities to ceaselessly flow into the channels of production and circulation so that the value of technology will fully manifest in the practice of economic construction.

We should hold various types of technological markets of various specialties. The scale and opening period of such markets may vary according to actual conditions, and they may be permanent or temporary. Through the development of technological markets, we should expedite three transfers, namely to transfer the technologies and talented people of the scientific research and designing institutes and colleges and universities of our province to medium-sized and small enterprises, township enterprises and the vast rural areas; to transfer the technologies of other provinces and municipalities, Beijing and Tianjin in particular, to our province; and to transfer military industrial technologies and personnel to civilian use. We should also link together the economic interest of research and designing institutes, colleges and universities, and production units in line with the law of value in order for them to share weal and woe together and work in close coordination.

3. We should greatly increase the ability of enterprises to absorb and develop technology, and continuously promote their technical progress and economic development.

The technical progress of enterprises is a strategic measure for them to gain vigor, improve economic results, exist amid competition, and achieve development. Increasing their ability to absorb and develop technology is a key issue which we should carry out in reforming science and technology. Facing the rigid challenge of the world's new technological revolution and the acute competition in domestic and foreign markets, we should all the more rely on technical progress, conduct technical transformations with great efforts, change the backwardness of equipment and technology, and enhance enterprises' ability to meet the changing situation and improve their economic returns.

Departments at all levels should grant autonomy to enterprises in order to promote technical progress so that, under the guidance of state plans, enterprises will have the right to decide on the direction of their technological and production development, to formulate their plans for creating new products, improving product quality, and developing new technology, and to promote their technical progress with more funds of their own.

On the premise that normal production is guaranteed, large key enterprises should concentrate their efforts on establishing or strengthening technological development and research organs. Medium-sized and small enterprises should install and replenish their technological development personnel in line with their own conditions. They may also cooperate with other enterprises to set up technological development organs of the same trades. Personnel contributing to technological development should be awarded.

#### 4. We should improve the new rural scientific and technological structure and promote the rural commodity economy.

In order to expedite the restructuring of the rural economy and develop it towards specialization, commodity production, and modernization, it is necessary to continue the principle of pooling the efforts of the state, the collective, and the individual, further create a vivid situation in rural areas in which various forms of scientific and technological development units at various levels are established, and improve the ability of counties, townships, villages and households to develop and popularize science and technology and to render service in this area. We should further establish and improve country and rural technological development centers, technological popularization stations, and various specialized technological service companies, greatly develop township multipurpose technological service companies and village technological service stations, encourage and support households to set up, individually or jointly, various scientific research and technological service organizations, strive to develop and improve scientific and technological model villages and households, and establish a coordinated scientific and technological network in rural areas of the province. In order to stabilize the contingent of agrotechnological popularization and increase its financial capacity to serve agricultural production, agrotechnological popularization funds of business entities and operational funds of technological service organs will be allocated through the original channels as usual, and the contract system and the paid service system will be implemented.

We should do a good job in regional technological development. Barriers between administrative areas and departments should be eliminated and the method of open bidding and entrusting to the best should be adopted in order to organize the scientific and technological forces of all sources to emphatically carry out comprehensive technological development in Taihang Shan, Heilong Harbor, Bashang, and coastal areas. Development should be carried out in line with the specific advantages of each area. For instance, coastal areas should do a good job in developing beaches and

fishery, and areas where minority nationalities live in compact communities should pay attention to the development of the nationalities economy. In the development, technology and products should be developed with coordination so that the advantage in regional natural resources can be changed into advantage in commodities and peasants can become rich as soon as possible.

5. We should reform the system of scientific and technical cadre management, and give full play to their initiative.

Competent personnel are the foundation of construction. The focus of economic development and market competition at home and abroad is competent personnel. Without competent personnel, modernization cannot be achieved. Comrade Xiaoping said: "In restructuring the economy, what is most important and what I am most concerned about is competent personnel. In restructuring science and technology, what concerns me most is still competent personnel."

There are two major problems in the province's talented people. One is the lack of competent personnel, and the other is the failure to bring into full play the role of the existing competent personnel. At present, the second problem is more conspicuous.

The key to solving this problem lies in our efforts to thoroughly break with the shackles of the "leftist" ideas, truly foster the idea of respecting knowledge and talented people, recommend, cherish, and train competent persons, and create favorable conditions for scientific and technical personnel to fully perform their functions. We should fully trust them politically, and recruit them into the party in a timely manner whenever qualified. We should promote to key academic and technical work posts those young and middle-aged scientific and technical personnel who are full of vitality and have fairly great attainments. We should create an environment where top competent persons can show their talents.

We should take active measures and policies to encourage the rational transfer of competent persons so that those in units where there are too many people can flow to the units where there is an acute shortage of competent persons, and those in cities can flow to the rural areas, in particular mountainous and sandy areas. The methods of personnel flow may vary. They may be transferred, but most of them will be employed. Problems emerging in the course of personnel transfer should not be solved in a simple way with administrative methods, but should be solved with methods worked out in a timely manner. In order to make the best use of and manage well the province's contingent of scientific and technical personnel, we should establish organs in charge of scientific and technical cadres. Areas where such organs have been set up should strengthen their personnel and do their work well in line with the functions as stipulated by Document No 21 issued by the provincial CPC committee last year. In areas where such organs have not been set up, relevant CPC committees and organization departments should take charge of the work and establish such organs as soon as possible.

4. We should conscientiously strengthen leadership over the reform of the scientific and technological structure.

Departments at all levels should step up their efforts in studying and formulating specific plans and measures for the reform, put them into effect in an earnest manner, and strive to achieve remarkable results in 3 years and complete the reform in 5 years. Restructuring of science and technology involves various trades and professions. Scientific and technological committees are government multipurpose functional departments in charge of scientific and technological work. They should of course take the responsibility for the reform. Reform, however, is by no means a task for scientific and technological circles alone. It is a common task for scientific and technological, planning, economic, personnel, educational, financial, tax, monetary, pricing and supply departments. All departments should work in close coordination to make it a success. In conducting the reform, counties should actively popularize practical technology which can be applied in large areas instead of one-sidedly seeking high-grade, precision and advanced technology in order to promote various industries in the rural areas, in particular township enterprises, and continuously emancipate the rural productive forces. Leading persons at various levels should rely on the masses of scientific and technical personnel, give full play to their initiative and creative spirit in the reform, and encourage them to plunge into the reform as masters of state.

Comrades, the CPC Central Committee's decision defines the orientation of the reform for us, sets forth the principles and policies, and puts forward explicit demands. As long as leading persons at all levels, the masses of scientific and technical workers, cadres and the masses throughout the province exert vigorous efforts to carry them out, the reform of the scientific and technological structure will certainly be a success in our province.

CSO: 4008/2006

NATIONAL DEVELOPMENTS

BRIEFS

**INTEGRATED CIRCUIT ASSEMBLY LINE OPERATIONAL**--Nanjing, 26 June (XINHUA)--China's largest integrated circuit assembly line was officially put into production yesterday in a radio factory in Wuxi, Jiangsu Province. The line, composed of facilities imported from Japan and the United States, is designed to produce enough integrated circuit chips for five million TV sets. In 1980, the workers began to build the assembly line, a major project approved by the state. Premier Zhao Ziyang and other leaders once inspected the construction work, according to a factory spokesman. Simultaneously, China's first assembly line for 18-inch color TV picture tubes began work in Xian, capital of Shaanxi Province. The Chinese made assembly line can produce 160,000 18-inch kinescopes and 1.12 million other kinescopes. [Text] [Beijing XINHUA in English 0747 GMT 26 Jun 85 OW]

**NATIONAL COMPUTER SOCIETY INAUGURATED**--Beijing, 1 June (XINHUA)--A national computer society was inaugurated here today. It will arrange domestic and international exchanges and popularize computer science and the application of computers in the country. It will also study the trend of computer development at home and abroad and spread new scientific and technological achievements. The society has 28 local branches with a total membership of 10,000. China built its first computer in 1959, and has since turned out different types of computers, peripheral equipment and terminals in small numbers, while providing software and services. At present, there are 100,000 computers in China, many of which are in use in the railway, petroleum, coal and textile industries, commerce, banking, the mass media and scientific research. [Text] [Beijing XINHUA in English 1303 GMT 1 Jun 85 OW]

**KEY PROJECT CHEMICAL WORKS**--Beijing, 25 May (XINHUA)--One plant of the Dongfang Chemical Works, a key state project with an annual capacity of 38,000 tons of acrylic acid and esters, went into official production here today. Acrylic acid is produced for the first time in China. The plant, imported from Japan, went into trial production last May. Products turned out so far are up to international standards and sell well in China and abroad, according to Beijing officials. [Text] [Beijing XINHUA in English 1632 GMT 25 May 85 OW]

**COMPUTER TECHNOLOGY APPLICATIONS**--Beijing, 22 June (XINHUA)--Shanghai has stepped up the building of 15 computerized information systems, the municipal paper "WEN HUI BAO" reported Friday. The systems will be used for statistics, banking, foreign trade, goods supply, customs, railways and the East China

power grid. The projects are scheduled for completion by 1990, the paper said. Some are already in use. The foreign trade department's system stores data on 30,000 foreign firms and business people trading with China and supplies 28 provinces, autonomous regions and municipalities. The computerized banking system has been instrumental in official research and statistics. The goods supply system has established 11 sub-systems for major goods, such as steel, timber and machinery products, which help analyse the situation of goods supply and speed up the turnover of working capital. The personnel system has stored data on 860,000 specialists and civil servants for government scientific administration. Vice Mayor Liu Zhenyuan was quoted as urging more efforts to apply application of computer technology and train computer operators. He disclosed that the city has developed 1,200 items of applied computer technology over the past few years and called for intensified efforts to apply them in various trades and services. [Text] [Beijing XINHUA in English 1101 GMT 22 Jun 85 OW]

INCREASE IN TECHNICAL WORKERS--Shanghai plans to double the number of its technical personnel by 1990 to cope with an expected shortage of skilled labor according to municipal government sources. This means training an extra 500,000 people, an official said. At present the country's leading industrial city has 480,000 people with secondary and above vocational education and certificates of technical competence. Technical personnel below 35 years of age only make up one-third of the total technical force of the city, he added. By 1990 the city will have 440,000 workers retiring, but there will be only about 260,000 people to succeed them, the official said. To cope with the shortfall, he said, the city plans to set up 25 professional schools in large and medium-sized enterprises. It has allocated 460 million yuan for education this year, 25 percent more than in 1984. Fourteen new professional schools on the outskirts will enroll 1,200 students in agriculture, animal husbandry, fishery and farm produce processing courses this autumn. Forty-four universities and colleges in the city also plan to run special classes to enroll 14,000 students from enterprises this year. /Text/ [Beijing XINHUA in English 1541 GMT 17 Jun 85]

TECHNICIANS SENT TO BORDERS--Since 1984, 17,000 technicians from coastal and central China have gone to work in border and hardship areas, PEOPLE'S DAILY reported today. Shanghai has sent more than 200 to Tibet and Xinjiang. Yunnan province has received 3,329 applications asking for work in the province. So far, 421 people from 24 provinces and municipalities have found work there. Eighty-two technicians from coastal and central China now work in Ningxia. /Text/ [Beijing XINHUA in English 1926 GMT 25 Jun 85]

TRAINING POPULAR IN FUJIAN--Young and middle-aged students from the rural areas are flocking to newly-set up technical schools and training classes in Fujian province. Now about 600,000 peasants are attending schools and training classes which specialize in agrotechnology, processing methods and commodity production, a local official said here today. Since the contract responsibility system linking remuneration with output was introduced several years ago, Fujian's rural economy has gradually turned to more commodity production. In the city of Sanming, a rural center about 175 km west of Fuzhou, courses are offered on cultivation of rice, mushrooms and edible fungus, planting fruit and other trees, raising pigs, chickens, long-haired rabbits and fish as well as in tailoring and maintenance of household electric appliances. In 1984, Sanming set up 2,547 new training classes for 74,000 students, the local official said. /Text/ [Beijing XINHUA in English 1847 GMT 24 Jun 85]

RETURNED STUDENTS IN SHANGHAI—Students returning from abroad have a big part to play in promoting China's scientific and technological progress, a Shanghai education official told Xinhua today. Shanghai, one of the main scientific, technological and educational bases of the country, has dispatched more than 4,000 people to study in over 40 foreign countries since 1978, when the country adopted the policy of encouraging international academic exchanges. Since the adoption of the new policy, some 1,700 students have returned from foreign countries such as the United States, France, Britain, Federal Germany and Japan to take up important posts in scientific and technological fields and education. Among 180 returned students of Fudan University, more than 90 have been promoted to department directors, research directors and teaching research office directors. Another three were appointed PhD tutors. Fudan's computer science department director, Wu Lide, who came back to China in 1981 after studying in the United States, compiled a book, "Essentials of Electronic Computer Teaching," for the country's universities and colleges. The return of these students, who have qualified in advanced research, has spurred the city's 45 universities and 700 research institutes to upgrade their laboratories and equipment. /Text/  
/Beijing XINHUA in English 1204 GMT 27 Jun 85/

CSO: 4010/2006

APPLIED SCIENCES

NUCLEAR ACCIDENT PROTECTIVE MEASURES OUTLINED

Beijing ZHONGHUA FANGSHE YIXUE YU FANGHU ZAZHI [CHINESE JOURNAL OF RADIOLOGICAL MEDICINE AND PROTECTION] in Chinese No 4, 25 Aug 84  
pp 66-72

[Article by Yao Jiaxiang [1202 1367 4382] of the Industrial Hygiene Experimental Office of the Chinese Center for Preventative Medicine: "Protection of the Surrounding Populace in the Event of Accidents at Nuclear Power Plants"]

[Text] Foreword

At present, many countries in the world are in the process of making great efforts to develop nuclear power and, moreover, there is a gradual tendency for nuclear power plants to be built on a large scale. According to the estimate of the tenth World Energy-Source Conference held in Istanbul, Turkey in 1977, by the end of this century nuclear power will account for 45 percent of the world's electric power. The Chinese Mainland has also begun to set about building nuclear power plants.

In order to protect the health and safety of nuclear power plant personnel and the surrounding populace, and to protect the environment, it is necessary for the site selection, planning, construction, and operation of nuclear power plants to be done in accordance with the strictest technical and safety standards and regulations. Thanks to this, in the more than 20 years since the world's first commercial nuclear power plant began operation there has been, generally speaking, an extremely good nuclear safety record. People recognize more and more clearly that, from the point of view of the entire fuel cycle, atomic power is much cleaner, and also much safer, than mineral fuel energy sources. The United States and West Germany have separately estimated the probability of the most serious type of nuclear power plant accident, i.e., the melting of the reactor core, as once in every 17,000 reactor-years and once every 10,000 reactors years respectively.

However, though the possibility of serious accidents at nuclear power plants is extremely small, nevertheless it still exists. For example, an accident like the damage to the pile core at the nuclear power plant at Three Mile Island in the United States, which was second in seriousness only to the melting of a reactor core, happened for the first time

after the nuclear power plant of the world had operated for a total of only 1,400 reactor-years. For this reason, the countries of the world place the greatest importance on the formulation of plans for dealing with emergencies at nuclear power plants and the protection of the surrounding populace, in order to reduce to the greatest degree possible the after-effects of the accident and protect lives and property.

Accidents at nuclear power plants can be divided, on the basis of the scope of their effects, into on-site accidents and off-site accidents. When an off-site accident occurs, large amounts of radioactive material are spread into the environment, forming a smoke plume, causing people's bodies to receive external radiation or, through inhaling polluted air or ingesting polluted food and water, internal radiation.

In order to take preventative measures, the government authorities of countries that have constructed atomic power plants, from central authorities to relevant local ones, must all formulate beforehand plans for the emergency handling of accidents at nuclear power plants. The reasons why the plans must be formulated in advance are as follows:

- 1) If one day an accident occurs at a nuclear power plant, the problems the authorities would have to cope with would be many and varied, so that if all the possibilities were not considered before the event, and proper arrangements made, then when the time came it would be hard to avoid being caught unawares by failing to take some necessary measure.
- 2) The situation in the event of an accident is likely to go through many changes, and the factors relating to the effects of the accident are also very complex, yet the one who decides what measures to take in order to deal with the emergency is the responsible local authority, and it is not possible for him to be an expert on nuclear protection. For this reason it is necessary, before the event, to formulate and provide guiding standards for the decision-making person to consult.
- 3) After the accident has occurred, decisions to adopt certain protective countermeasures would tend to be made under very tense circumstances, and these countermeasures themselves may have some disadvantageous aspect. If careful study is not carried out before the fact, and people go into action before the logical sequence of measures is worked out, then it is quite possible that inappropriate decisions will be made.
- 4) Dealing with a radiation accident involves comparatively many departments, with a great many people taking part, and it is necessary for them to be coordinated so they can work in unison. If careful plans are not worked out beforehand, and clear work assignments made, then when the time comes people will simply get in each other's way and be hard to direct.
- 5) Since the probability of a serious accident is extremely small, there is a great lack of experience in dealing with this kind of accident, and we must basically rely upon the formulation of plans before the event, and on the carrying out of drills to discover potential problems and accumulate experience.

## The Major Content Of Contingency Plans

The central links in plans for dealing with emergencies are clearly investigating the off-site effects of a nuclear accident, and adopting appropriate measures for protecting the populace. The major content of the contingency plans is as follows:

### 1. Establishing an organizational structure for dealing with the accident, and clearly defining responsibilities and task assignments.

In the event of an off-site accident, the responsibility for organizing and leading the work of combating the disaster will fall on the local government authorities. Of course the relevant central government organizations and departments must also direct the local authorities, and provide human, material, and technical support. The local government will immediately establish an emergency command post (called by the IAEA an "Emergency Relief Coordination Center") to be headed by a senior administrative officer, and set up functional organizations under it, including a specialized consultative group, communications and liaison group, radioactivity monitoring group, residents' guidance and control group, and medical treatment and rescue group. In fact, relevant organizations within the government, such as those concerning the management of atomic power, public security, civil defense, medical treatment and hygiene, agriculture and foodstuffs, environmental protection, meteorology, telecommunications and traffic must all provide appropriate support under the unified leadership of the command group, and must function in a coordinated, timely, and methodical way. With this end in mind, when contingency plans are formulated one must, through discussion, clearly stipulate the responsibilities and work tasks of each and every department, and their responsibilities must be continually coordinated by the control group.

### 2. Establishing a procedure for the reporting of accidents, and strengthening the connections among the various organizations.

When in the course of operation of a nuclear power plant some unusual circumstance has the potentiality of developing into an accident, the plant authorities should immediately report it to those in charge of the emergency relief organization as well as to other concerned organizations, enabling them to gain sufficient time to make arrangements for dealing with the emergency. Continuous reports should be made in response to developments in the situation. Stipulations should be made regarding the procedure, method, and content of reports. A list of the names of all personnel who must be informed should be included in the contingency plan, along with their addresses and telephone numbers, and if there are any changes in these they should be timely corrected.

It is necessary to strengthen connections between the nuclear power plant and the emergency relief organization, within the emergency relief organization, and between it and other concerned organizations. The command group should be provided with communications equipment such as a separate, special telephone line, walkie-talkies, and even teleprinters.

### 3. Means and methods of estimating the accident situation and its effects.

Analysis and evaluation of the situation of an accident within a nuclear power plant will be carried out mainly by the authorities of the plant and reported to the command group. The emergency relief organization will be responsible for monitoring the off-site environment. For this purpose one can make use of the already-established monitoring points, dispatch monitoring teams to the areas being irradiated by radioactive material, and carry out monitoring in accordance with the stipulated items. Before the event, one can delineate in advance the limits of the areas to be monitored, determine inspection routes and survey sampling points, and designate a specialized laboratory to carry out analysis. Based on the results of the survey, one can estimate the degree and scope of environmental pollution, and measure in advance the dose of radiation the populace has received.

### 4. Style and content of propaganda and alarms given to the populace.

In order to enable the people residing around the nuclear power plant to understand the goals and major content of the contingency plans, and reduce confusion in implementing them, during ordinary times one can print and issue pamphlets or leaflets, and have them printed in the local telephone directory, propagandizing to the broad mass of residents. The content of these should include the safety of the nuclear power plant and the small possibility of an accident occurring there, the alarm signal, the radio frequency used when emergency reports are broadcast, the location of shelters, storage and distribution points of iodine tablets, evacuation routes and directions, and a list of things to be taken along in an evacuation.

Alarm systems generally employ sirens. When an accident occurs, the command group will decide whether and when to issue the alarm, and will make use of radio and television stations to issue news and directions to the populace, the content of which will be the time and circumstances of the accident at the given nuclear power plant, estimates of how the situation will develop, and what measures the populace should adopt.

### 5. Criteria for deciding what protective measures should be taken, and their method of implementation.

Before the event one must delineate the areas in which protective work is to be carried out, and determine what protective measures should be adopted at each and every stage following the occurrence of an accident, how to evaluate the advantages and disadvantages of each, and provide the policy making reference standards for intervention and derivations.

Make proper arrangements for specific implementation methods for various protective measures such as the distribution of iodine doses and the evacuation of the populace. Agree on a maximum tolerable radiation dose for personnel engaged in rescue work.

6. Compile emergency reference materials and technical pamphlets.

Before the event, compile various kinds of useful materials: 1) regarding organizational structures, such as the emergency organizations of the various concerned organizations; 2) regarding society and environment, such as a map of the area in which the nuclear power plant is located, statistics on population and the number of households communications and transportation facilities, shelters and construction materials such as reinforcing bars and concrete which can be used by personnel to construct shelters, special facilities, and medical treatment and rescue organizations; 3) relating to estimating the effects of radiation, such as the situation of the nuclear power plant, the meteorology of the area, methods of calculating the dose of radiation received, environmental monitoring during ordinary times and following an accident, and agricultural and dairy products and drinking water. For each technical measure, operating methods and procedures should be stipulated in detail, and compiled into a technical manual.

7. Preparation of materials and equipment needed for the contingency plan.

These materials and equipment will be provided mainly by the various concerned organizations taking part in implementing the contingency plan, but they must be provided for in advance, especially some equipment and facilities not used during ordinary times, such as high-capacity radioactivity monitoring equipment.

8. Medical treatment and rescue, and the cleansing of personnel.

Dispatch medical treatment/cleansing groups separately to the site. Assign medical treatment units to control and treat radiation injuries and ordinary injuries and illnesses arising from the accident, and send the seriously radio-injured to specialized hospitals. These medical treatment units should be equipped with body-surface pollution monitoring equipment and facilities for cleansing the body.

9. Relieving the emergency, and restoring normalcy afterward.

One must stipulate the conditions under which the emergency can be said to have been eliminated, arrangements for the relocation of the populace to the area and for the resumption of normal production and life, and means for the elimination of long-term pollution from the area. The lessons to be derived from the accident must be assimilated, and contingency plans revised.

10. Training of personnel and on-the-spot drills.

Dealing with nuclear accidents is very complex, and requires specialized knowledge, added to which, there is a lack of practical experience. Therefore it is necessary to draw up plans for the training, according

to specialty, of the personnel who are to take part in dealing with the accident, and also to carry out drills at specified times. One can first carry out drills separately according to the different tasks, such as communications and liaison, organization and leadership, giving and circulating the alarm, radiation monitoring, policy decisions, and implementing shelter, treatment and cure, and afterwards carry out a coordinated drill. Shortcomings discovered in the course of practice drills can be improved right away.

#### Protective Activity Areas And Alarm Systems

##### 1. The delineating of protective activity areas.

When a nuclear accident occurs, in order to be able to quickly and effectively implement protective measures to the surrounding populace, the U.S. Atomic Energy Commission and the Environmental Protection Agency have established a protective activity zone, called a "contingency plan zone," around nuclear power plants. It is divided into an inner and an outer zone. The inner zone, with a radius of 16 kilometers, is the area through which the radioactive smoke plume passes, and in which people can be irradiated over their entire bodies and, through ingestion, be affected by internal radiation. The outer zone, with a radius of 80 kilometers, is the area in which people can be affected by internal radiation through ingestion. In determining the area irradiated by the radioactive smoke plumes to have a radius of 16 kilometers, it was taken into consideration that in the event of an occurrence at a given nuclear power plant of a "planning guidelines accident" or one in which there has been damage to the core, the populace living outside this area would not receive more than the level of irradiation (five rems over the entire body) specified in the "protective activity guidelines" (PAG), and that even in the event of an accident in which the core melted they would not receive a fatal dose of acute irradiation. In the inner zone, protective measures should be adopted to avoid irradiation by the radioactive smoke plume. As for determining the outer zone to have a radius of 80 kilometers, this was because the level of pollution specified in the "protective activity guidelines" can occur in the area downwind from the accident, and the greater part of the radioactive particles in the smoke plume will descend within an area having a radius of 80 kilometers; therefore the protective measure of limiting food will be implemented within this area. In the course of actually delimiting such areas for a contingency plan, appropriate adjustments can be made on the basis of the local situation regarding population, topography, land utilization, roads, and administrative divisions.

The nuclear safety department of the Swiss Ministry of Energy Resources has established a similar contingency plan zone, divided into an inner, middle, and outer zone. The inner zone, having a radius of 3-5 kilometers, is limited to the area in which the accumulated dose of external irradiation from the smoke plume, for those remaining out in the open air for several hours, can be as high as 100 rems; the middle zone has a radius of 20

kilometers; the outer zone, being the zone in which radiation is absorbed through food and drink, has no definite radius.

The Ministry of Science and Technology of the West German Federated Republic, in its "West German Hazard Research," has also proposed a protective activities zone around nuclear power plants. Taking into consideration the particular problems associated with a nuclear accident, as well as the comparatively high density of the West German population, the protective activity zone has been delineated into the following areas:

Area A, being an inner circle with a radius of 2.4 kilometers, and a downwind 30-degree fan-shaped area with a radius of eight kilometers. Regardless of the method of release of the radioactive material or what the environmental conditions are, two hours after the occurrence of the accident, people residing in this area should take cover indoors and bide their time (with eight hours the maximum period for taking cover), and then evacuate.

Areas B1 and B2, being the downwind areas estimated to receive a radiation dose of more than 100 rads per week. Within the area having a radius of 24 kilometers (area B1), regardless of the method of release of the radioactive material or what the environmental conditions are, after two hours people should take cover indoors for at least 14 hours. For the area in which the range of the 100 rad/week effect extends beyond 24 kilometers (area B2), no special protective activities have been specified. Personnel of areas B1 and B2 should transfer out as soon as possible after 14 hours.

Area C, being the (downwind) area inside a boundary line within which the dose of radiation received over a person's entire body is estimated to amount to 250 rads in 30 years. The population living in this area should begin transferring out after 30 hours in the proportion of five square kilometers per day.

Areas D1 and D2, being the area in which the dose of radiation received over the entire body is estimated to be less than 25 rads in 30 years, or the (downwind) area inside a boundary line within which, following decontamination, the dose is less than 25 rads. In this area it is normally permitted for people to carry on with their normal activities.

## 2. Alarm system.

In order to enable the populace of the protective activity area to get the alarm speedily, Switzerland has set up within a radius of 20 kilometers (i.e., in the inner and middle zones) a three-level alarm system:

(1) Preliminary alarm. When a serious accident situation begins to occur at a nuclear power plant (when the emergency core-cooling system is switched on, or when the level of radiation within the protective

casing rises), use a special alarm telephone to issue the preliminary alarm simultaneously to the various concerned authorities and organizations to enable the organizations responsible for dealing with the accident to begin to make preparations. This alarm will not be given to the populace, and will also not be given to unspecified personnel.

(2) General alarm. When a serious accident occurs at a nuclear power plant, safety devices fail to operate, the various indicators (such as radiation level, pressure, water level, and temperature) continue to worsen, and it is estimated that a large quantity of radioactive gas and radioactive material is going to be released into the environment, use the network of sirens to issue the "general alarm." After the populace hears this siren's signal, they must pay attention to the emergency reports broadcast on radio and television. The issuing of this alarm is the joint responsibility of the nuclear power plant and the local command organizations charged with dealing with nuclear accidents. The former will issue the alarm to the populace in the inner zone, and the latter will issue the alarm to the populace in the middle zone.

(3) Radiation alarm. When there is serious damage to the core, and the release of a large quantity of radioactive material is already unavoidable, use the network of sirens to issue the radiation alarm, the signal to be distinct from that of the general alarm. After the populace hears this signal they should immediately enter the nearest building and take cover, and close all the doors and windows. It would be best for the populace living in the inner zone to take cover in underground rooms or shelters. The division of responsibility for issuing the radioactive alarm is the same as that for the general alarm.

#### **Division Of The Progress Of The Accident Into Periods.**

The progress of the entire accident can be divided into three stages or three periods, that is, an early period, a middle period, and a recovery period. It is necessary to consider safety measures for the populace separately with specific regard to the particular features of each stage.

##### **1. The early stage.**

This indicates the first few hours from the appearance of indications of accidental release till after release has begun. When an accident occurs at a nuclear power plant, the beginning of radioactive release and its relevant time durations can be seen in table 1. For convenience in planning, the early period can be calculated as twelve hours. The paths of radiation during the early period are direct irradiation from the atomic installation, external irradiation caused by the smoke plume and falling ash, and inhaled radiation. The making of decisions regarding protective measures at this time will largely depend on circumstances provided by the atomic facility.

Table 1. The beginning of radioactive release and its related time durations.

Time from the first indication that something is wrong to the beginning of release into the environment.	From 0.5 hours to one day.
Duration of release of radioactive material.	From 0.5 hours to several days.
Duration of the greater part of the radioactive release.	From 0.5 hours after the beginning of release to one day.
Time from the release of the material to its arrival at an irradiated point.	Eight kilometers requires 0.5-2 hours; 16 kilometers requires 1-4 hours.

## 2. The middle period.

This indicates the period from several hours after, to one or several days after, the accidental release. In this period radioactive release has already basically ceased, and a large quantity of radioactive matter has settled and accumulated on the ground. The paths of radiation during this period are: (1) external irradiation caused by ground-surface radioactivity; (2) internal irradiation caused by contaminated water and food or agricultural products such as milk from contaminated areas, or internal irradiation caused by inhaling radioactive material rising from the surface of the ground. In this stage, specialists will already have been summoned to the scene, and can make suggestions regarding the relevant protective measures based on the results of environmental monitoring.

## 3. Recovery period.

In this stage the decision to restore normal living conditions will be made. The duration of this period is comparatively long, and the principal goal during it is to carry out decontamination of fields, roads, houses, and workplaces.

Protective measures that can be adopted during each stage can be seen in Table 2. Protective measures that can be used to counteract the various channels of radiation during the various stages can be seen in Table 3.

### Advantages And Disadvantages Of The Various Protective Measures.

At present almost any one of the protective measures capable of lessening the dose of radiation that members of the public receive has some disadvantage, such as a health hazard or social and economic loss. For this reason, one must weigh the disadvantageous aspect of implementing the protective measure against the danger from the estimated exposure to radiation. The general principle that must be grasped in making policy decisions is that, for the protective measures implemented, the social price and hazard should be smaller than the price and hazard brought about by exposure to the radiation. Now we shall separately present the advantages of the various protective measures, as follows:

#### 1. Taking cover indoors.

When the radioactive smoke plume passes, taking cover inside a building, and closing all the doors and windows, can effectively prevent external irradiation, and greatly reduce the dose of internal irradiation and contamination of the body. The smaller the wind-permeability of a building is, the smaller the internal irradiation dose and bodily contamination dose of the personnel within. Considering the differences in the structural nature of buildings and in the degree to which they are airtight, the dose reduction coefficient is between 2-50. After the smoke plume passes, one must open the doors and windows to enable the

radioactivity that has entered the room to spread and descend outside. This method is simple and easy to do, and if people take cover indoors for only a few hours, the hazards and danger are very small. If people have to take cover for a period longer than that planned, for longer than twelve hours, for example, then this could lead to social, medical, and hygienic problems, and cause people to become anxious due to not knowing where their family members have gone to.

## 2. Taking iodine.

Taking either potassium iodide or potassium iodate can effectively block the thyroid gland from absorbing  $I^{131}$  or some other iodine species. The effect of taking iodine is best before the smoke plume arrives or as it is arriving; taking it six hours after the iodine species have been absorbed can reduce the dose to the thyroid gland by half; after more than 24 hours taking it has no effect. The dose to be taken is as follows: (1) Children over the age of one year and adults, in the first 24 hours should take 130 mg of potassium iodide or 170 mg of potassium iodate (the equivalent of 100 mg of iodine), and afterwards should take each day 65 mg of potassium iodide or 85 mg of potassium iodate; (2) Children less than one year of age should be given 65 mg of potassium iodide daily. If it is not necessary, it should not be taken continually, and in any case not for longer than ten days.

The danger of the precaution of taking iodine is far smaller than that of being affected by radiation. Among the people at large, only certain individuals have an allergic reaction to iodine. However, the diet of the population of some areas is lacking in iodine, there is a comparatively high incidence of thyroidism, and the taking of iodine could give rise to bad reactions. Before the smoke plume arrives, when time is of the essence, the distribution of iodine doses could pose a problem; for this reason, local health departments should, before the event, inform the people regarding when to take iodine, where the drugs are stored, and what the dosage is, and draw up an effective distribution plan.

## 3. Controlling entry and exit.

The control of entry and exit from the area is implemented together with the measures of taking cover and evacuating the population, the difference being the length of time. Through it, one can avoid contamination being spread outside, and prevent people from entering into the sealed-off area and being exposed to radiation; and it is beneficial for the carrying out of rescue work. The problem remaining is the blocking of traffic, with the people being blocked anxious because they cannot return home or enter into the sealed-off area to salvage their belongings.

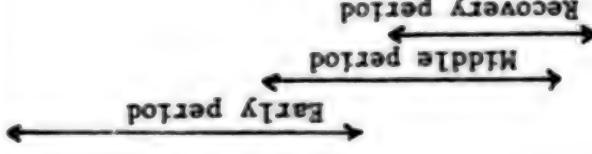
Table 2. Protective measures that can be adopted at each stage.

Protective measure	early period	middle period	recovery period
Taking cover	++	+	+
Taking Iodine	++	+	+
Evacuation	++	++	++
Controlling entry and exit	++	++	++
Individual protective measures	+	++	+
Cleansing of personnel	+	+	+
Medical treatment	-	+	++
Prohibiting use of the food and water	+	++	++
Decontamination of the area	-	+	++
Feeding with stored fodder	+	++	++

Note: "++" is a measure which can be adopted, and might be essential.  
 "+" is a measure which can be adopted, yet whose necessity is slightly less.  
 "-": not necessary.

Table 3 Protective measures that can be used against the various channels of radiation during each stage.

Radiation Path	Time limit	Corresponding measure						
		Evacuation	Taking cover	Controlling exit and entry	Prohibiting use of food	Taking iodine	Individual protection	Decontamination
1. External irradiation from the atomic installation		X	X	X	X	X	X	X
2. External irradiation from the smoke plume		X	X	X	X	X	X	X
3. Inhalation radiation in the smoke plume		X	X	X	X	X	X	X
4. Contamination of hair, skin, and clothing		X	X	X	X	X	X	X
5. External irradiation from ground surface-accumulated radiation		X	X	X	X	X	X	X
6. Inhalation fallen radioactive ash that has been raised into the air again								
7. Contaminated food and water								



#### 4. Evacuation of the populace.

This is the most serious countermeasure, adopted only when there is no alternative and when the proper conditions exist. This measure can protect the populace from external irradiation from the smoke plume and internal irradiation caused by inhaling radioactive dust, and from external irradiation from the contaminated ground surface and internal irradiation caused by inhaling raised dust. The difficulty in making the policy decision to evacuate is that, under the circumstances of not knowing thoroughly in advance how the accident will develop, what areas it will influence or what dose of radiation the populace will receive, there is no way of knowing whether or not the danger from the radiation will be greater than the danger created by the evacuation. In making this decision one must consider the following factors: the magnitude and special characteristics of the accident, the size of the population requiring evacuation, roads and traffic equipment available, sites where the evacuees will be taken in, weather and available human and material resources.

Evacuating the population requires time, and in the early period one can generally only evacuate specially designated areas or specially designated crowds. The ideal time for evacuation is before the smoke cloud arrives, but this generally cannot be done. It is not good to evacuate as the smoke cloud passes, otherwise the dose of radiation received will be greater than that when taking cover indoors; only when the accident situation is becoming more and more serious, and it is estimated that there will be an even greater radioactive release, can the population be evacuated during the early period. Withdrawing the people taking cover during the middle period can effectively reduce the radiation coming from the highly polluted environment.

If the population is evacuated in a planned, orderly way, the hazard will be comparatively slight. The major danger will be traffic accidents, as well as the special problems of looking after the old and infirm. Problems that will be encountered are traffic congestion, the breaking of communications contact, some people refusing to be evacuated, disorder and the necessity of maintaining public security. Industrial and agricultural production will sustain economic loss.

#### 5. Individual protective measures.

These include protection of the breathing passages and the wearing of protective clothing. Wearing a gauze mask, a folded handkerchief, or a towel wrapped around the face can greatly reduce the inhaled dose. Wearing a hat, goggles, or a gauze kerchief wrapped around the head; wearing protective clothing (or putting old clothing on over one's regular clothing), and binding up one's sleeves and pants-legs can prevent contamination of the body surface. After the radioactive smoke plume has passed, one must remove all the protective items that one is wearing. This measure is simple and easy to do, and not very inconvenient. Personnel carrying out their duties in contaminated areas should use regulation protective equipment.

Table 4 West German emergency measures against different doses of external irradiation and irradiation of the entire body caused by inhalation.

Dose ( )	Take cover indoors	Evacuate
~ 200	Necessary, right up to before evacuation	Necessary
~ 100		
~ 50	Necessary	Recommended
~ 25		
~ 10	Recommended	Do not

Table 5 West German protective measures against different thyroid doses caused by inhaling iodine and tellurium.

Dose ( )	Take cover indoors	Take iodine	Evacuate
~ 1000	Necessary, right up to before evacuation	Necessary	Necessary
~ 500			Recommended
~ 200	Necessary	Necessary	Not necessary
~ 100			
~ 50		Recommended	
~ 25			
~ 10	Recommended	Not necessary	Do not

Table 6 The European Economic Community's emergency dose reference levels

Emergency activity	Dose equivalent levels ( $\mu$ sieverts)			Upper limits			
	Entire body	Tyroid gland, lung or other single organ	Skin		Entire body	Thyroid gland, lung or other single organ	Skin
Evacuating the population	10	30	100	50	150	300	
Taking cover indoors	0.5	5	5	2.5	25	25	
Taking Iodine	—	5	—	—	25	00	

## 6. Cleansing of personnel.

Ordinary people can use regular bathing facilities to wash. As for those with a high degree of contamination, it is necessary to use special facilities for washing, and also to carry out monitoring.

## 7. Medical treatment.

The rescue of the populace is the responsibility of the personnel of the emergency organizations, such as Red Cross, public security, civil defense, or other trained personnel. The work of medical treatment will be carried out by doctors. The populace of the affected areas is to be divided into three types: (1) those who have been neither wounded nor exposed to radiation; (2) those suffering from radiation disease who need to be treated; (3) those suffering from radiation disease or contaminated wounds who need to be sent to specialized hospitals for treatment. Medical personnel, based on medical judgments, will administer purgative drugs to those who have inhaled or ingested radioactive material. The difficulty in this work is that specialized organizations for treating radiation damage are very few, and for this reason one should carry out specialized training of a small number of medical personnel in presently-existing medical treatment organizations, and add some equipment. Making the most possible use of radiologists and of radiological personnel and equipment can reduce the cost of a contingency plan.

## 8. Controlling food and water sources.

The radioactive material released can pollute food items such as food crops, vegetables, fruits and milk, and water sources. Regarding food one can, depending on the circumstances, adopt different methods of control such as prohibiting use, processing, or destruction; the use of contaminated water sources must be prohibited. Before these decisions are made there will have been time to obtain the results of environmental monitoring, and for this reason all these measures are carried out during the middle period or the recovery period. Values for  $I^{131}$  in milk will appear 48 hours after radioactive release, so that control of milk should be somewhat earlier than for other food items. Evacuating milch cows from their grazing areas, and changing their feed to stored fodder, can reduce the contamination of milk. This countermeasure will be inconvenient for old people, children, and sick people. For areas which have been contaminated for a long time, the supply of uncontaminated food and drinking water will pose difficulties. And the price for destroying or processing food will also have to be paid.

## 9. Decontamination of the area.

The decontamination of the ground, facilities, houses, roads, and fields will be carried out during the middle period or the recovery period. The specific methods are: (1) the surfaces of roads and houses should

be rinsed with water and vacuumed; (2) farmland and grazing areas should be ploughed over; (3) shovel away the surface layers of soil, and bury it at assigned storage places; (4) equipment should be washed clean with water and decontaminants; (5) burning and burial of contaminants. Personnel engaged in decontamination work can become contaminated themselves; they need to wear protective clothing, and control the dose of radiation they are exposed to. The decontamination of large-scale ground areas and road surfaces involves considerable trouble and expense. Weather conditions can influence the progress of decontamination work; the tasks are difficult in the winter. There may be difficulties with the storage and disposal of radioactive wastes. All kinds of goods and materials will become contaminated, creating economic losses.

#### Levels Of Intervention.

For the convenient reference of policy decision-makers, contingency plans should include an indication of which protective measures to adopt in response to which levels of radiation dose. These dosage levels are designated by different names by the various countries, such as "protective activity guidelines," "emergency reference levels," "levels of intervention," and "levels of activity," all of which mean pretty much the same thing. The International Atomic Protection Committee has not proposed any specific suggestions regarding levels of intervention, but each country has made stipulations on its own initiative based on social and economic conditions and a consideration of advantages and disadvantages. Regarding the levels of intervention of the United States, the Soviet Union, and Japan, these have already been presented in a previous article and are omitted here. The West German emergency dosage levels are shown in Tables 4 and 5.

Great Britain in July, 1981 made a comparatively big revision of the "Emergency Reference Levels of Dose" stipulated in 1975. In July, 1982 the European Economic Community Committee made a further slight revision of these British emergency reference dose levels (see Table 6), promulgated them as a radiation protection standard for controlling the public dose during accidental release of radioactive material, and gave them to their member countries to consult when drawing up contingency plans.

The EEC Committee asserted that this dose equivalent level is only applicable for drawing up contingency plans prior to the accident, or for supplying to the authorities concerned for reference in making policy decisions in the early period, i.e., within twelve hours, after the occurrence of the accident; as for more than twelve hours after, the authorities would have had ample time to convene specialists and arrive at policy decisions based on the results of environmental monitoring; therefore these proposed values would no longer be applicable. Due to the fact that decisions on dealing with the contamination of food, drinking water, and the ground surface can be made at a comparatively late time, no reference levels for adopting this kind of activity have

have been indicated in the table. This emergency reference level has considerable latitude, i.e., it has stipulated lower and upper limits. Below the lower limits, at least from the point of view of preserving health, it is not considered necessary to take any action; however, that does not exclude action taken below the lower limit for social or political reasons. Above the upper limits, action must be taken, except under particular circumstances, such as bad weather conditions in which it is not possible to implement a certain measure. Between the upper and lower limits, the authorities concerned can, after looking at the local circumstances and weighing the advantages and disadvantages, formulate their own levels of interference.

In the early period of the accident, effective measures for avoiding or reducing the inhabitants' radiation dose are taking cover indoors, taking iodine, and evacuation. The costs, and the disadvantages produced, of these measures are different, and for this reason different dose limits have been stipulated for each of them. In addition, the value for the upper limit has been fixed at five times that of the lower limit, with only the upper limit for the skin dose for evacuation given as three times the lower level; this was to avoid random effects. The authorities of each country can also, on the basis of special factors, set levels of intervention outside these dose limits; for example, if the diet of the local inhabitants is lacking in iodine, the upper radiation dose limit for taking iodine can be greatly increased, because in taking iodine they might be taking a comparatively great risk. In deciding to adopt a new measure, one should consider the reduction in dose that has been accomplished by the measures already implemented.

For convenience in applying these emergency dose reference levels, it is necessary to formulate guidance levels for radioactive concentration of environmental samples.

We have related above the several major problems relating to the concerned authorities' carrying out the work of protecting the inhabitants when accidental release occurs at a nuclear power plant. Although some jobs will not be done by the health departments, nevertheless health departments have the important responsibility of protecting the health of the people, and should actively participate, and also do a good job of their own work. They must not only coordinate with other departments, and draw up feasible plans, but they must also conscientiously do a good job of the work of preparation. The Chinese Mainland's atomic power plants are just in the initial stage of development, and we must place importance on the mastery of relevant intelligence data, and assimilate useful experience from abroad, enabling us to consider problems more thoroughly and carefully, so that we will be able to handle serious problems with ease. Experience in dealing with atomic accidents might also serve to complement our emergency handling of some other natural and human disasters.

9634  
CSO: 4008/76

APPLIED SCIENCES

CHINESE, FOREIGN HIGH-SPEED CMOS PRODUCTS

Shanghai XIANDAI TONGXIN [COMMUNICATIONS TODAY] in Chinese No 12, 8 Dec 84  
pp 29-30 (2)

[Article by Hao Hong'an [6787 7703 1344]: "Characteristics of High-speed CMOS"]

[Text] Specifications for the 4000B/4500B series of standard CMOS products were officially and uniformly formulated in May 1980. In only 2 or 3 years the Joint Electronic Device Engineering Council (JEDEC) opened deliberations on specifications for the high-speed CMOS logic 74HC series, planning to seek uniform specifications within a short time. By the end of 1983 there were more than 100 different HC series products developed by various companies. There have also been some products in China (the Changzhou Semiconductor Factory and the Shangwu Factory No 14 have produced about 20 different devices in the 40H series). The Shanghai Component Factory No 5 worked toward producing 74HC products in the latter half of 1984, and the Shangwu Factory No 14 plans to have products in 1985.

At present, HCMOS product specifications provided by each unit are about the same. Table 1 lists the chief characteristics of HS-CMOS and other logic ICs.

I. Limit parameters and typical conditions

Table 2 shows the limit parameters for high-speed CMOS series products as announced by various companies; table 3 gives typical working conditions, that is, the application working conditions as recommended by each factory.

Table 1. Comparison of Various Logic ICs ( $V_{DD}$  or  $V_{CC}$  is 5 Volts)

类 (a) 型	系 (b) 列	电源电压 $V_{DD}$ 或 $V_{CC}$ (c) [伏]	输入高电平 $V_{IH}$ (d) [伏]	输入低电平 $V_{IL}$ (e) [伏]	输出低电平输入 电流 $I_{DN}$ 或 $I_{OL}$ (f) [毫安]	输出高电平输出 电流 $I_{DH}$ 或 $I_{OH}$ (g) [毫安]	工作温度 范围 (h) [摄氏度]	输入高/低 电平漏电 $I_{IH}/I_{OL}$ (i)	
								1. 伏	2. 毫安
LS-CMOS	74HC	3~6	3.5	1	4	-4	-40~85	1/1	
	54HC				( $V_{OL} = 0.4$ 伏)	( $V_{OH} = 4.2$ 伏)	-55~125		
标准CMOS	4000B/4500B	3~18	3.5	1.5	0.44	-0.44	-40~85	1/1	
					( $V_{OL} = 0.4$ 伏)	( $V_{OH} = 4.6$ 伏)			
LS-TTL	74LS	4.75~5.25	2	0.8	4	-0.4	0~70	400/20	
	54LS	4.5~5.5			( $V_{OL} = 0.4$ 伏)	( $V_{OH} = 2.7$ 伏)	-55~125		
ALS-TTL 或 FAST	74ALS	5±0.25	2	0.8	4	-0.4	0~70	200/20	
	74F				( $V_{OL} = 0.4$ 伏)	( $V_{OH} = V_{OL} - 2$ 伏)			

Key:

Column heads:

(a) type

(b) series

(c) power source voltage,  $V_{DD}$  or  $V_{CC}$

(d) input maximum level  $V_{IH}$

(e) input minimum level  $V_{IL}$

(f) intake current at minimum output level  $I_{DN}$  or  $I_{DL}$

(g) leaked current at maximum output level  $I_{DH}$  or  $I_{OH}$

(h) operating temperature range

(i) leaked current at max/min input level  $I_{IH}$  or  $I_{IL}$

Standard values:

1. volts [V]

2. milliamps [mA]

3. Centigrade

4. microamp

Table 2. HCMOS Limit Parameters from Various Factories ( $V_{SS} = 0$  V)

II. 公司 (厂)	MOTA (1)	NS (2)	RCA (3)	东芝 (4)	松下 (5)	日立 (6)	常州半导 (7)
1 电源 $V_{DD}$ (伏)	-0.5~7	+	+	+	+	+	-0.5~6
2 输入 $V_{IH}$ (伏)	-0.5~ $V_{DD}$ + 0.5	+	+	+	+	+	+
3 输出 $V_{OH}$ (伏)	-0.5~ $V_{DD}$ + 0.5	+	+	+	+	+	+
4 输出 $I_{OL}$ (毫安)	25	+	25 35(极)	25	+	+	
5 电源 $I_{DD}$ 或 $I_{OSS}$ (毫安)	50 75(极)	50 50 70(极)	50	+	+		
6 输入漏电 $I_{OL}$ (毫安)		20		20			
7 允许功耗 $P_{D}$ (毫瓦)	500	+	+	+	+		
8 存放温度 $T_{ERS}$ (摄氏度)	-65~180	+	+	+	+	+	-60~125
9 热阻温度 $T_{A}$ (10秒)	300	+	+	+	+		260

[Key on following page]

**Key:**

**Row headers:**

**I. Parameters**

1. power source  $V_{CC}$  (volts)
2. input  $V_{in}$  (volts)
3. output  $V_{out}$  (volts)
4. output  $I_{out}$  (mA)
5. power source  $I_{CC}$  or  $I_{GND}$  (mA)
6. input clamping  $I_k$  (mA)
7. allowable dissipation  $P_d$  (mW)
8. storage temperature  $T_{STG}$  (Celcius)
9. bonding temperature  $T_b$  (10 seconds)

**Column headers:**

**II. Companies**

1. Motorola
2. National Semiconductor
3. RCA
4. Toshiba
5. Matsushita
6. Hitachi
7. Changzhou Semiconductor Factory

**Table 3. Typical Operating Conditions for HCMOS (74HC Series)**

I. 參 數	II. 公 司(厂)							(7)
	MOTA (1)	NS (2)	RCA (3)	大 芝 (4)	松 下 (5)	日 立 (6)	常州半 導 體 廠 (40H 系列)	
1 电源 $V_{CC}$ (伏)	2~6	3~6	2~6	2~6	1.4~6	2~6	3~6	
2 输入电平 $V_{in}$ (伏)	0~ $V_{CC}$	~	~	~	~	~	~	
3 输出电平 $V_o$ (伏)	0~ $V_{CC}$	~	~	~	~	~	~	
4 工作温度 $T_{OPR}$ (摄氏度)	-40~85	~	~	~	~	~	~	
5 上升/下降时间 $t_r/t_f$ (毫微秒)	0~500	~	~	~	~	~	~	

**Key:**

**Row headers:**

**I. Parameters**

1. power source  $V_{CC}$  (V)
2. input level  $V_{in}$  (V)
3. output level  $V_o$  (V)
4. operating temperature  $T_{OPR}$  (C)
5. rise/fall interval  $t_r/t_f$  (ns)

**Column headers:**

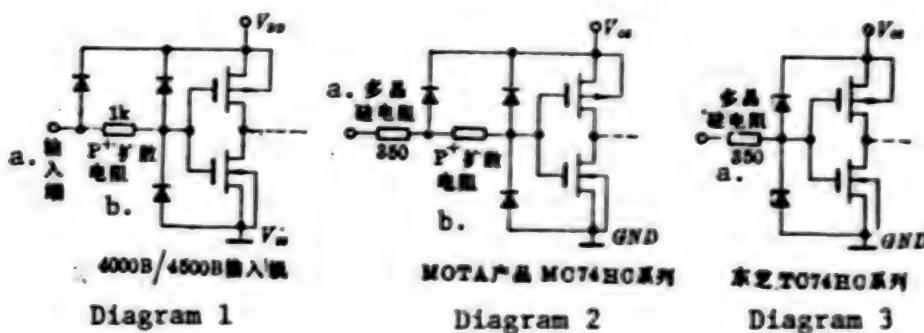
**II. Companies**

1. Motorola
2. National Semiconductor
3. RCA
4. Toshiba
5. Matsushita
6. Hitachi
7. Changzhou Semiconductor Factory (40H series)

## II. Parameter characteristics

1. Scope of working voltages. Approximately 2 to 6 volts are standard. Working voltage for standard CMOS is up to 20 volts, whereas the new HCMOS, or 74HC series, is basically the same as TTL/LS TTL.
2. Increased input protection. Input protection resistors for 74HC series all use polysilicon resistors to limit input current (figure 1), which improves resistance to voltage spikes. This is also a necessary condition for high-speed work.

Figure 1. Comparison of CMOS Input Circuits



### Key:

- Diagram 1, caption: 4000B/4500B Input Levels
  - a. input terminal
  - b. P+ diffusion resistor
- Diagram 2, caption: The MOTOROLA MC74HC Series
  - a. polysilicate resistor
  - b. P+ diffusion resistor
- Diagram 3, caption: The Toshiba TC74HC Series
  - a. polysilicate resistor

3. Standardization of output current. Permits output current values of up to 25 mA, and general buffered output can reach 35 mA and higher. Power source lead lines are permitted 50/70 mA. It is obvious that it is no problem for the 74HC series to drive LEDs (around 10 mA). In the 4000B/4500B standard CMOS series, only a few special devices, like the 4049, 4511, etc., can drive a LED.
4. Input overshoot allowable currents ( $I_g$ ). General overshoot input current is permitted to reach 20 mA. This is the allowable value of input overshoot pulse current, and is also the allowable value of input clamped diode current.
5. Range of operating temperatures ( $T_{opr}$ ). The allowable range of operating temperatures for the 74HC series is from -40 to +85 C. These values are much greater than the TTL 74 series range of 0 to 70 C.

### III. Problems to be aware of in applications

Aside from a portion of IC input stages in Schmitt trigger form, many CMOS products do not allow changes in the rise and fall of input levels to be too slow. In the 74HC series, it is largely required that input be 0.5 microseconds less than the interval between rising and falling ( $t_r/t_f$ ). This is because the interior of the 74HC series is composed of three level or more gate circuits, and changes in input levels that are too slow would create output fluctuation, and the scattering of gate thresholds ( $V_{th}$ ) (not uniform) will cause sequential logic error obstruction. Moreover, at the same time P/N 2 channel MOS-FETs will come together, increasing useless dissipation.

Ordinarily, the gate thresholds  $V_{thc}$  of all levels of CMOS are 1/2 the source voltage, and because the increase is very high at this time, when there is a very small amount of fluctuation in input this will create a corresponding change in the output logic levels. Therefore, when input levels are long they will be above or below  $V_{thc}$  and the output will be very unstable. For this reason, in applications capacitors should be added to the leading step of the power source to eliminate interference caused by the power source leads. One must add approximately 0.1 mF to gate circuits, and must add about 1,000 pF to latches, counters, etc., at which time the upper threshold of  $t_r/t_f$  can reach 1 ms.

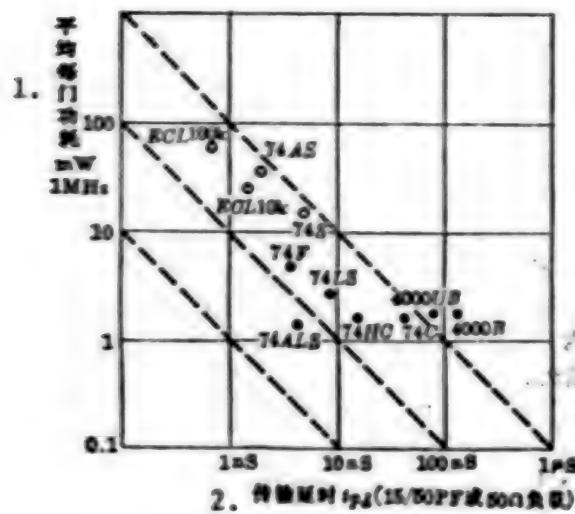
As for the problem in current use of standard CMOS whereby one should be careful of damage by static disruption, triggering (blocking) of parasitic thyristors, etc., these problems must also be guarded against in the 74HC series of high-speed CMOS. In applications, aside from being aware of their high speed working characteristics, all one has to do is to handle them in the same way as the 4000B/4500B series CMOS.

### IV. On the overall characteristics of the 74HC series

Static dissipation of CMOS is extremely small, but it increases proportionally as the operating frequency rises. But in a piece of equipment operating at a clock rate of several MHz, not all ICs will often be operating at this high rate of speed, so average dissipation will not be great but will be in general less than 1/10 of the 74LS series.

Figure 2 shows the general distribution of the dissipation/speed for the 74HC series and other kinds of logic circuits. Conditions are an operating frequency of 1 MHz, differing loads upon the various ICs, CMOS generally considered at 50 pF, TTL types at 15 pF, and ECL at a 50 ohm load. This is because CMOS input capacitance is rather great, and when interconnected for use, the load capacitance is naturally great, which is truly a deficiency of CMOS.

Figure 2. Dissipation and Speed of Each IC



Key:

1. Average Dissipation per Gate in mW at 1 MHz
2. Propagation Delay  $t_{pd}$  (15/50 PF or 50 ohm load)

12586  
CSO: 4008/1009

ENVIRONMENTAL QUALITY

GUILIN WORKING TO STOP POLLUTION, CLEAN ENVIRONMENT

OW230856 Beijing XINHUA in English 0837 GMT 23 Jun 85

Text Guilin, a tourist attraction noted for its picturesque scenery and crystal clear Lijiang river, is to modify all its pleasure boats to prevent increments, waste water from being discharged directly into the Lijiang river.

This is part of a recent decision by the city authorities toward off pollution.

Pleasure boats will be equipped with special devices for treating the waste matters. The project is required to be completed by the end of June, next year.

To protect the underground water resources, the decision says, discharge of waste water into carst caves is banned. The city proper will become a smoke-free area. The city has also decided to produce more liquefied petroleum gas and electricity to cut smoke pollution.

An automatic air pollution monitoring station will be built to help enforce the measures.

The city authorities said that noise pollution will be controlled at below 70 DB and an automatic noise display device will be put up at a major street junction.

Guilin, famed for its beautiful Lijiang river and the exotic mountains flanking it, was visited by 283,000 tourists in 1984. The annual average increase has been 35 percent. Construction of tourist facilities has been speeded up since 1979, when the state council issued a directive calling for work to boost tourism there.

Since then, 23 polluting factories have been closed or switched to other lines of production. Two waste water treatment plants with a daily handling capacity of 40,000 tons have been built.

New parks, flower beds and pavilions were also built around scenic spots in the past few years. Historical buildings and cultural relics were renovated.

CSO: 4010/2005

ENVIRONMENTAL QUALITY

BRIEFS

LHASA'S LOW AIR POLLUTION--This Tibetan capital is one of the cleanest cities in the world to breathe in, according to a 1-year survey just completed. The city's present air turbidity index--which indicates levels of air pollution--is only 0.04 to 0.06, said scientists from the Lanzhou Institute of Plateau Atmospheric Physics in Gansu province, who carried out the survey. Air is regarded as being clean when it is measured at below 0.1 on the internationally-recognized index. The scientists attributed Lhasa's clean air to its virtual absence of smoke-discharging factories, and the vast grasslands and woods in surrounding areas. /Text/ /Beijing XINHUA in English 1110 GMT 5 Jun 85/

NEW USE OF COAL DUST--Coal dust, an industrial waste and public hazard, has been turned to use at the Pingdingshan industrial base, the CHINA ENVIRONMENT journal reports today. About 550,000 tons of this material was used annually in recent years to build roads, make bricks and inject into mines to stop fires. Magnetized coal dust can improve soil, 225 to 300 tons per hectare increasing grain production by 10 to 30 percent. Pingdingshan in Henan province discharges more than 60,000 tons of coal dust a year and has dumped 3 million tons on 100 hectares of farmland, causing serious pollution. Local government has mobilized funds and personnel since 1980 to research into possible uses. Three new products, including coal dust microbeads, yielded over 4 million yuan in output value in 1984 and saved much land and fuel. /Text/ /Beijing XINHUA in English 1106 GMT 22 Jun 85/

SHANGHAI REPORTS ANTISPOLLUTION MEASURES--Six of Shanghai's 10 districts are now smokeless zones, Liu Xiangguang, vice chairman of the municipal patriotic public health campaign committee, reported here today. Giving an account of the city's environmental protection efforts to delegates from Beijing, Tianjin and Shanghai, he said that the content of dust, sulfur dioxide and lead in the city's atmosphere has dropped to the lowest in 12 years. He said that Shanghai, China's biggest industrial and commercial center, has resurfaced 500 km of urban roads, and one-third of the sewage pipes have been overhauled since 1984. The city, which has a population of 6 million, gives high priority to rubbish and sewage disposal. It recently completed its first sewage treatment plant, and when six more which are at present under construction are finished, it will be able to process 1,600 million liters per day. A newly-built rubbish treatment plant and a brick plant consume 400 tons of rubbish a day, and 200 sealed excrement pools have a combined capacity of 100 million liters. However, about 4 billion liters of sewage flow untreated, mainly into the Yangtze river delta, each day, and this is the municipal government's next target, Liu said. Shanghai invested 400 million yuan in public utilities last year, double the figure for 1984. This investment will be increased to 850 million yuan this year, according to Liu. /Text/ /Beijing XINHUA in English 0833 GMT 21 Jun 85/

FACTORIES MAKE ANTI POLLUTION DEVICES--Nearly 50 factories have opened here since 1980 to produce a whole array of weapons to fight the battle against pollution in this major industrial city. Five years ago, there was only one plant here producing such equipment, according to local environment protection officials. Now there are 47 making 100 different devices to reduce or monitor pollution. Products manufactured include equipment for controlling air, water and noise pollution, metric instruments to detect pollutants, mobile contamination monitors and special materials and fittings for environmental protection. A service company has been set up in the city to provide technical consultation and market information for these factories. One advanced device, a new type of sulphuric acid purifier, has been applied to the city's iron and steel enterprises, and is proving to have a purification efficiency of 98 percent. The development of the antipollution industry in Chongqing is vital to environmental protection in the upper reaches of the Yangtze river as well as across the whole of South-Western China, local official said. Plans have been drawn up to apply microcomputers and bioengineering technology in the development of the environmental protection industry over the next 5 years. /Text/ /Beijing XINHUA in English 0829 GMT 21 Jul 85/

CSO: 4010/2005

SCIENTISTS AND SCIENTIFIC ORGANIZATIONS

BRIEFS

**ELECTRONICS INSTITUTE TO MOVE**--With the approval of the third line construction readjustment and transformation planning office of the State Council, Research Institute No 38 of the Ministry of Electronics Industry will be relocated from Duyun in Guizhou Province to Hefei of Anhui Province. Leading comrades of both the Anhui Provincial CPC Committee and the provincial government have expressed their vigorous support for the relocation. A special meeting, presided over by Vice Governor Shao Ming on behalf of Governor Wang, has studied issues related to the relocation of the institute and decided to set up a preparatory office and a leading group for the relocation with Shao Ming as the head of the leading group. [By Shi Songnian and Chen Rongbo] [Text] [Hefei ANHUI RIBAO in Chinese 17 Apr 85 p 1 OW]

**CHINESE COMPUTER SOCIETY INAUGURATED**--Beijing, 2 Jun (XINHUA)--After the plan to set up the Chinese Computer Society was deliberated and approved by the Standing Committee of the China Association for Science and Technology, the Chinese Computer Society was formally inaugurated with the approval of the State Commission for Restructuring Economic System. Yan Jici, Hua Luogeng, Li Xianglin, and Sun Junren attended and addressed the inauguration yesterday. The predecessor of the Chinese Computer Society was the Electronic Computer Committee of the Chinese Electronics Society. The committee was formed in June 1962. [passage omitted] [Excerpt] [Beijing XINHUA Domestic Service in Chinese 1559 GMT 2 Jun 85 OW]

**CHINESE CHARACTER CODING MEETING HELD**--Fuzhou, 23 May (XINHUA)--The second meeting for academic exchanges held by the Chinese Character Coding Specialized Committee of the China Society for Chinese Language Information was recently held in Fuzhou. The meeting studied and appraised the more than 400 existing Chinese character coding input plans in an effort to select and popularize a simple and easy Chinese character coding input plan with great economic efficiency and universal practicality for standardization. The technology handling Chinese language information is the key to popularizing and applying electronic technology in China. At present, the work is proceeding rapidly. Yuan Yizhong, a professor of the computer department of Liaoning University who has devoted himself to the study of Chinese character coding method for many years, has already turned out a three-generation coding system which, after trial application, is proven to operate quickly on computers. A simple and easy method for the input of macroscopic Chinese characters devised by Professor Qian Weizheng, council chairman of the China Society for Chinese Language Information

and president of the Shanghai Industrial University, is relatively easy for learners and users because it conforms with the law of learning Chinese characters. A number of young and middle-aged coding designers have also developed some excellent Chinese character coding input plans. At the present, the work is focused on how to make the computerized Chinese character coding technology more practical. [By Cai Qinghe] [Text] [Beijing XINHUA Domestic Service in Chinese 0845 GMT 23 May 85 OW]

CSO: 4008/1041

18 July 1985

Acoustics

AUTHOR: TANG Yingwu [0781 2019 0710]  
XIAO Jinquan [5135 6855 3123]

ORG: Institute of Acoustics, Academia Sinica, Beijing

TITLE: "Averaged Sound Intensity in Leap-layer Shallow-water"

SOURCE: Beijing HAIYANG YU HUZHAO [OCEANOLOGIA ET LIMNOLOGIA SINICA] in  
Chinese No 6, Nov 84 pp 550-557

TEXT OF ENGLISH ABSTRACT: The leap-layer is assumed to consist of two isovelocility water-layers. The expressions of the decay law of the averaged sound intensity with range are derived when the source and receiver are laid in the same isovelocility water-layer or in two different isovelocility water-layers respectively. The results show that there is apparent depth-constitution in the sound field in leap-layer. The theoretical results agree quite well with the practical data.

12949

CSO: 4009/107

AUTHOR: ZHOU Jinzhong [0719 6855 0022]  
WEI Liansheng [7614 6647 3932]

ORG: Institute of Atomic Energy

TITLE: "Determination of the Stability Constants of Coordination of 18-Crown-6 with Lanthanum (III) by Ion Exchange Method"

SOURCE: Beijing HE HUAXUE YU FANGSHE HUAXUE [JOURNAL OF NUCLEAR AND RADIOCHEMISTRY] in Chinese Vol 7, No 1, Feb 85 pp 48-50

TEXT OF ENGLISH ABSTRACT: The main object of this work is to demonstrate whether the ion exchange method can be used to determine stability constants of coordination compounds in non-aqueous solution. For this purpose, the determination of the stability constants of coordination compounds of 18-crown-6 with Lanthanum (III) by ion exchange method was investigated. The result ( $\log \beta = 3.36$ ) obtained is in good agreement with values by pNa and calorimetry method. This demonstrates that the ion exchange method is reliable and can be used to study the stability of coordination compounds in non-aqueous solvents such as methanol.

12949

CSO: 4009/218

Atomic Energy

AUTHOR: CHEW Lianzhong [7115 6647 0112]  
SHA Yaqin [3097 0068 3850]

ORG: Institute of Atomic Energy

TITLE: "Determination of Cu, Na and Au in Biological Materials and Semiconductors by Neutron Activation-Substoichiometric Multielement Separation"

SOURCE: Beijing HE HUAXUE YU FANGSHE HUAXUE [JOURNAL OF NUCLEAR AND RADIOCHEMISTRY] in Chinese Vol 7, No 1, Feb 85 pp 63-64

TEXT OF ENGLISH ABSTRACT: In this paper a radioanalytical method for substoichiometric multielement group separation is studied and applied to reactor neutron activation analysis. Zinc diethyldithiocarbamate  $Zn(DDC)_2$  is used as the chelating agent. By a single extraction gold is separated quantitatively, and copper substoichiometrically at the same time, while sodium is not extracted and remains in aqueous phase. These elements are separated from 2N  $H_2SO_4$  and 0.1 N  $HClO_4$  medium. This separation method is applied to the activation analysis of biological materials. Copper and gold are separated from interfering elements with high activity (principally  $^{24}Na$ ) and determined accurately with high sensibility. The method proves very suitable for the determination of copper, sodium and gold, the principal toxic elements in the semiconductor.

12949  
CSO: 4009/218

Atomic Energy

AUTHOR: GU Zhengfang [7357 2182 5364]  
ZHOU Zhihong [0719 1807 1347]  
HUANG Yannian [7806 1693 1628]  
JIANG Yanlin [1203 1693 2651]

ORG: Institute of Atomic Energy

TITLE: "Calculation of the Equilibrium Constants of U(IV)-U(VI) Electron Exchange Reactions From Isotope Shifts of Trialkyl Phosphate Solid Chloro Complexes Measured by I. R. Spectra"

SOURCE: Beijing HE HUAXUE YU FANGSHE HUAXUE [JOURNAL OF NUCLEAR AND RADIOCHEMISTRY] in Chinese Vol 7, No 1, Feb 85 pp 7-12

TEXT OF ENGLISH ABSTRACT: The isotope frequency shifts of the uranous and uranyl chloro solid complexes with three kinds of trialkyl phosphate (TMP, TEP, TBP) are measured by I. R. spectrometry. The isotope shifts of uranyl chloro solid complexes are  $0.87\text{--}1.18\text{ cm}^{-1}$  and the value from theoretical calculation is  $0.70\text{ cm}^{-1}$ . The isotope shifts of uranous complexes are  $0.05\text{--}0.18\text{ cm}^{-1}$ , and the calculated value is  $0.16\text{ cm}^{-1}$ .

From the above data the equilibrium constants of the U(IV)-U(VI) electron exchange reactions are obtained in the range of  $1.0013\text{--}1.0018$  for these systems.

The influence of the donor ligands on the effect of isotope shift is discussed.

12949  
CSO: 4009/218

Atomic Energy

AUTHOR: CHEN Yaozhong [7115 5069 0022]  
TAN Bingmei [6151 3521 5019]  
LIN Zhangji [2651 3361 1015]

ORG: Institute of Atomic Energy

TITLE: "Ion Exchange Separation of Transplutonium Elements in Aqueous-Alcohol Media II. The System of  $\text{CH}_3\text{OH}-\text{LiNO}_3-\text{HNO}_3$ -DTPA-Anion Exchange Resin"

SOURCE: Beijing HE HUAXUE YU FANGSHE HUAXUE [JOURNAL OF NUCLEAR AND RADIOCHEMISTRY] in Chinese Vol 7, No 1, Feb 85 pp 52-55

TEXT OF ENGLISH ABSTRACT: The absorption selectivity of Am, Cm, Cs, Sr, Zr-Nb, Ru, Gd, Eu, Sm, Pm, Nd, Pr and Ce in the system of  $\text{CH}_3\text{OH}-\text{LiNO}_3-\text{HNO}_3$ -DTPA-anion exchange resin is determined, and the separation factor ( $\beta_{\text{Am/cm}}$ ) is found to be 5 as compared to 3 for the old system. Am and Cm can be separated from most fission products including rare earth elements using eluate chromatography. The separation factors of this system between light rare earth elements is obviously larger than those of  $\alpha$ -HIBA cation exchange resin.

12949  
CSO: 4009/218

Chemistry

AUTHOR: YI Ruishi [2496 3843 1102]  
CAO Derong [2580 1795 2827]

ORG: Lanzhou University

TITLE: "Ion-exchanger Colorimetry Microdetermination of Uranium (VI) in Natural Water"

SOURCE: Lanzhou LANZHOU DAXUE XUEBAO (ZIRAN KEXUE BAN) [JOURNAL OF LANZHOU UNIVERSITY (NATURAL SCIENCE EDITION) in Chinese Vol 20, No 2, 28 Jun 84 pp 87-91

TEXT OF ENGLISH ABSTRACT: 2-(5-bromo-2-pyridylazo)-5-biethylaminophenol forms a violet red complex with uranium (VI). A maximum in the neighborhood of 585nm has been detected. This complex can be exchanged with strong basic anion resin and can be used to determine uranium (VI) directly by ion-exchanger colorimetry. The Beer's law is obeyed for 0-4.0ug/250ml of uranium (VI) in the presence of CYDTA+NaF+SSA mixture with PH 7.85. This method can be used for the determination of trace amounts of uranium (VI) in natural water.

12949

CSO: 4009/1004

Chemistry

AUTHOR: CHEN Jianhou [7115 1696 0186]

ORG: Tianjin Chemical Works

TITLE: China's Polyvinyl Chloride Industry

SOURCE: Beijing XIANDAI HUAGONG [MODERN CHEMICAL INDUSTRY] in Chinese Vol 4, No 6, 20 Dec 84 pp 11-13

TEXT OF ENGLISH ABSTRACT: China's first 3,000 T/Y PVC plant was put into production in 1958. The total PVC output in the country reached 483,000 tons in 1983. The PVC industry is one of the important plastics industries in China. Currently, the feedstock of VCM is mainly the carbide acetylene method, however the carbide acetylene method and the petro ethylene method will hold equal positions in the near future in China. One plant, using petro ethylene as feedstock, was put into production in 1977, while two large PVC plants were being built. Over 80 percent of PVC industry in China uses suspension polymerization system. Seven new VCM's passed the Ministry of Chemical Industry Appraisals in October 1983. The greater part of a 30m<sup>3</sup> polymerizer has been built in China. An 80m<sup>3</sup> polymerizer is completed and is now being tested. The R-VCM in PVC has been reduced to 5-10 ppm and the emissive VCM in the environment to less than 30mg/m<sup>3</sup>. In conclusion, some suggestions on the technical reform and developmental trend of the PVC industry in China are given.

CSO: 4009/1041

AUTHOR: QIN Mengzhao [4440 1332 0340]  
XIE Chunsheng [6200 2504 3932]  
LIAN Deshou [2733 1795 1108]  
TAN Qingming [6151 1997 2494]  
LIU Xiaoping [0491 1420 5393]

ORG: QIN of Computer Center, Academia Sinica; XIE and LIAN of the Third Chemical Engineering Institute, Xian; TAN and LIU of the Institute of Mechanics, Academia Sinica

TITLE: "A Software for Numerical Calculation of Nonstationary Compressible Fluid and Elasticity-Plasticity in Two Dimensions"

SOURCE: Beijing SHUZHI JISUAN YU JISUANJI YINGYONG [JOURNAL ON NUMERICAL METHODS AND COMPUTER APPLICATIONS] in Chinese Vol 5, No 3 Sep 84 pp 129-137

TEXT OF ENGLISH ABSTRACT: The LTDL code is a software that can be used to solve nonstationary multi-material compressible fluid i.e. the problem of penetration of metal projectile or jet, high velocity impact and other problems in explosion mechanics. This paper describes the structure and some test problems of the LTDL code.

12949

CSO: 4009/1018

AUTHOR: MA Sui [7456 6706]  
ZHAO Yupeng [6392 3768 7720]

ORG: MA of the Harbin Electrical Works and ZHAO of the Northeast Heavy Machinery Institute

TITLE: "The Sieve Method of Matrix Elements"

SOURCE: Beijing SHUZHI JISUAN YU JISUANJI YINGYONG [JOURNAL ON NUMERICAL METHODS AND COMPUTER APPLICATIONS] in Chinese Vol 5, No 4, Dec 84 pp 232-237

TEXT OF ENGLISH ABSTRACT: The method of M.M. Flood is an important method for solving some optimization problems. The central point at issue is to take up some optimization problems for a chance to find out the zero elements which are neither in the same row nor in the same column of the matrix.

This paper gives a programming method in the  $n \times n$  matrix to find a group of the most zero elements which are neither in the same row nor in the same column and to compile the Algol-60 program for some schemes to operate on the TQ-16 machine.

12949  
CSO: 4009/1017

Computer Applications

AUTHOR: ZHOU Baomin [0719 0202 3046]

ORG: Computer Station, the Chinese Academy of Space Technology

TITLE: "A Highly Accurate Method for the Stiff Boundary Value Problem"

SOURCE: Beijing SHUZHI JISUAN YU JISUANJI YINGYONG [JOURNAL ON NUMERICAL METHODS AND COMPUTER APPLICATIONS] in Chinese Vol 5, No 4, Dec 84 pp 248-257

TEXT OF ENGLISH ABSTRACT: In this paper we discuss numerical methods for the boundary value problem

$$\begin{cases} -\epsilon u''(x) + \alpha u'(x) = f(x), & x \in (0, 1) \\ u(0) = 1, u(1) = 0 \end{cases}$$

where  $\epsilon > 0$  is a small parameter,  $f$  is a smooth function on  $(0, 1)$ , and  $\alpha > 0$  is a constant. The following results have been proved: this method is of fourth order accuracy, and is stable and convergent. Finally, the results of the numerical tests are presented.

12949

CSO: 4009/1017

Computer Applications

AUTHOR: QIN Mengzhao [4440 1322 0340]  
TAN Qingming [6151 1987 2494]  
LIU Xiaoping [0491 1420 5393]  
XIE Chunsheng [6200 2504 3932]

ORG: QIN of Computer Center, Academia Sinica; TAN and LIU both of the Institute of Mechanics, Academia Sinica; and XIE of the Third Institute of Chemical Industry, Xian

TITLE: "A Splitting Method for Compressible Fluid and Elastic-plastic Fluid (LTDL) in the Two Space Dimensions and Time"

SOURCE: Beijing SHUZHI JISUAN YU JISUANJI YINGYONG [JOURNAL ON NUMERICAL METHODS AND COMPUTER APPLICATIONS] in Chinese Vol 5, No 4, Dec 84 pp 193-208

TEXT OF ENGLISH ABSTRACT: An Eulerian numerical calculation program (LTDL) using the splitting method and tracer points to make different schemes and represent the interface of materials respectively, is applied to solve the problems of multi-material fluid elastic-plastic bodies in two dimensions and time, i.e. the problems of penetration of metal projectiles or jet and high velocity impact, and other problems of explosion mechanics.

12949  
CSO: 4009/1017

Computer Development

AUTHOR: Qiu Yijie [0092 0308 2638]

ORG: Nanjing Engineering College

TITLE: "Processing Algorithms of Message Transmission in Microprocessor-based Remote Control Systems"

SOURCE: Beijing JISUANJI YANJIU YU FAZHAN [COMPUTER RESEARCH AND DEVELOPMENT] in Chinese Vol 21, No 11 [Nov] 84 pp 22-29

ABSTRACT: Speed and reliability in message transmission over long distances where remote control is employed to achieve a level of control and management or for safety reasons remains a problem. Three algorithms for checking the accuracy of received information were tested. The algorithms were: (1) the resend coincidence checking method in which a message was sent from the control unit to the remote unit then sent back to the control unit and compared with the original message. The original message is sent eight times before an error announced. (2) The great number checking method in which each byte is sent three time and if two or more received messages are identical, the message is considered correct. (3) The redundancy checking method in which bytes are disassembled and sent by the control in a specific order then compared on receipt by receiver. These three algorithms were compared in terms of passing rate, miscode rate, misoperations rate, and average transmission time. The tests proved that the redundancy algorithm and the great number algorithm both satisfied the minimal norms established though each has some specific advantages depending on the demands of the situation. Both algorithms can also be used simultaneously.

8226

CSO: 4009/1020

AUTHOR: XUE Xichao [5641 1585 6389]  
ZHAO Hongen [6392 7703 1869]  
ZHANG Fengying [1728 7685 5391]

ORG: 601 Institute, Third Ministry of Machine Building Industry

TITLE: "The Curved Finite Elements Analytical Method for Combined Structures and Its Application"

SOURCE: Beijing SHUZHI JISUAN YU JISUANJI YINGYONG [JOURNAL ON NUMERICAL METHODS AND COMPUTER APPLICATIONS] in Chinese Vol 5, No 3, Sep 84 pp 151-166

TEXT OF ENGLISH ABSTRACT: This study is devoted to aircraft structures. The analytical methods of determining the deformation and stress of structures made of complicated reinforced shells both in ambient and in heated conditions are exploited by using the curved elements of different accuracy, such as beams, plates, membranes and shells. Then the general purpose computing program is presented. The spline functions are used to described the computational models and several geometrical data are automatically generated. Curved shells and curved beam elements are dervied by considering both the overall accuracy of the analysis and the computing scale, and an unified element combination and transformation data base is established. An advanced optimal algorithm for mesh nodes labeling is presented. A frontal solution with efective optimal selection of eliminating order is obtained. A diagnostic code for monitoring the program run is incorporated, so that the wrong signals are displaced and debugging process is provided. In practice, these methods are effective. A large number of computational examples and practical applications show that this general purpose computing program has such features that a satisfactory higher accuracy with valid computational scale and minimum amount of input information and data is achieved for engineering application.

12949  
CSO: 4009/1018

AUTHOR: LIN Kaiyu [2651 7030 1946]  
YANG Kai [2799 0418]  
ZHANG Rongxing [1728 2837 1630]  
YANG Songhe [2799 2b46 7729]

ORG: LIN and YANG of Wuhan Technical University of Surveying and Mapping;  
ZHANG and YANG of the Hubei Environmental Protection Institute

TITLE: "Remote-sensing Monitoring of Change of the Jiang Han Lakes Due to  
Reclamation and Cultivation"

SOURCE: Dalian HUANJING KEXUE XUEBAO [ACTA SCIENTIAE CIRCUMSTANTIAE] in  
Chinese No 1, Mar 85 pp 20-29

TEXT OF ENGLISH ABSTRACT: In this paper, an experiment on monitoring change  
due to reclamation and cultivation of the Jiang Han lakes is described. In  
order to make a survey for the past and recent situation of the total number  
and total area of the lakes in Hubei Province, an approach using optical  
affine rectification with the help of computer assisted scanning statistics of  
LANDSAT MSS images is designed. The experimental results show that the  
relative accuracy of lake area has decreased from 609 to 309, and the total  
area of the lakes reduced from  $4708\text{km}^2$  to  $2657\text{km}^2$ , over the period from the  
1950's to 1980's. This deteriorating situation of the lake area due to  
reclamation and cultivation has resulted in ecological imbalance in that  
area. Therefore, it is now the time to draw attention to environmental  
protection and rational management of the Jiang Han lakes.

12949  
CSO: 4009/2j5

AUTHOR: WU Xiongxun [0702 3574 8113]  
XU Cuizhen [1776 5050 3741]

ORG: WU of the Wusi Environmental Protection Office, Jiangsu and XU of the Wusi Second Pharmaceutical Plant, Jiangsu

TITLE: "Research On the Treatment of Pharmaceutical Process Wastewater with a 22M<sup>3</sup> Up-flow Anaerobic Reactor"

SOURCE: Beijing ZHONGGUO HUANJING KEXUE [ENVIRONMENTAL SCIENCES IN CHINA] in Chinese No 2, 21 Apr 85 pp 59-64

TEXT OF ENGLISH ABSTRACT: This paper describes some results of pilot-plant study on the treatment of pharmaceutical process wastewater with a 22M<sup>3</sup> upflow anaerobic reactor. These waste-liquids are composed of residuals from the production of lemonic acid, calcium lactate and general antibiotic. The following results are equal to 2 days and 36°±2°C respectively (average).

Removal efficiency: 89.7% (COD), 70.1% (VS)

Volumetric loading rate: 18.6kgCOD/m<sup>3</sup>.d 12.03kgVS/m<sup>3</sup>.d.

Gas production rate: 15.6m<sup>3</sup>/m<sup>3</sup>.d (wastewater) 7.47m<sup>3</sup>/m<sup>3</sup>.d (digester).

Methane transform rate: 0.32CH<sub>4</sub>m<sup>3</sup>/kgCOD 0.51CH<sub>4</sub>m<sup>3</sup>/kgVS.

Influent concentration: 30000-50000mgCOD/l.

Influent total solid concentration: 28.9g/l.

Influent volatile solid concentration: 25.07g/l

In the study of stochastic, process of input which are typical of actual waste water was simulated. It has been shown that the reactors efficiency is high and performance satisfactory.

12949  
CSO: 4009/231

Environmental Sciences

AUTHOR: ZHANG Aichen [1728 7224 3819]  
YE Wenhui [0673 2429 5706]

ORG: The Environmental Scientific Center of Beijing University

TITLE: "Some Environmental Aerodynamic Problems in Atmospheric Pollution"

SOURCE: Beijing ZHONGGUO HUANJI JOURNAL [ENVIRONMENTAL SCIENCES IN CHINA] in Chinese No 2, 21 Apr 85 pp 54-58

TEXT OF ENGLISH ABSTRACT: The dispersive behaviour of smoke moving along with wind is strongly influenced by the dynamic and thermodynamic conditions of the warm surface underneath. In the field of fluid mechanics and physics of atmospheric boundary layer, it has received more attention recently. As a result, a new branch of science, Environmental Aerodynamics has been established.

This paper introduces some interesting subjects of environmental aerodynamics such as jumping of the roughness of surfaces, effects of heat on island, flows over hills and so forth and their influence on the process of atmospheric diffusion was emphasized.

12949  
CSO: 4009/231

AUTHOR: HE Shiyu [6320 2514 3842]  
YANG Mingdeng [2799 6900 7844]

ORG: The Shanghai No 1 Medical College

TITLE: "A Research of Joint Toxicity for Acrylonitrile and Acetonitrile Complex on Mouse"

SOURCE: Beijing ZHONGGUO HUANJING KEXUE (ENVIRONMENTAL SCIENCES IN CHINA) in Chinese No 2, 21 Apr 85 pp 41-45

TEXT OF ENGLISH ABSTRACT: After a group of mice were administered with acrylonitrile and acetonitrile complex mixed by various proportions of toxicity dosage orally, the Q value (OLD<sub>50</sub>/PLD<sub>50</sub>) observed raised with the approach of the proportion of dosage of the compound administered, the average time of death was prolonged with the increase of acetonitrile dosage administered in the complex. The peaks of both acrylonitrile and acetonitrile absorbed in the blood of the mice appeared 1 hour after administration. The CN peak released by acrylonitrile in the blood appeared 2 hours after administration, while that by acetonitrile appeared after 8 hours. The CN peak released by other complex groups in the blood all appeared between 2 to 8 hours after administration and the value of the peak declined with a decrease in the proportion of acetonitrile dosage administered. The concentration of the peak was closed to the total CN amount released by acrylonitrile and acetonitrile administered separately. Thus, according to the analysis of toxicity mechanism of both compounds and their complex, it is concluded that the joint effect of acrylonitrile and acetonitrile complex on mice is additive.

12949  
CSO: 4009/231

AUTHOR: GU Zuyi [7357 4371 1355]  
QI Beijing [2058 5563 7234]  
SHI Jialiang [0670 1367 2733]  
ZHOU Bawen [0719 5359 2429]  
XU Yatong [1776 0068 0681]

ORG: Department of Biology, Eastern China Normal University, Shanghai

TITLE: "Treatment of Organic Wastewater Using Photosynthetic Bacteria"

SOURCE: Beijing ZHONGGUO HUANJING KEXUE [ENVIRONMENTAL SCIENCES IN CHINA] in Chinese No 2, 21 Apr 85 pp 29-33

TEXT OF ENGLISH ABSTRACT: This paper reported the study of treatment of organic wastewater using photosynthetic bacteria under dark facultative aerobic and light facultative anaerobic conditions. In the treatment of soybean effluent using *Phdopseudomonas sphaerooides* "S", the COD reduction reached 91-93 percent. This continuous culture was carried out at dissolved oxygen 0.5-1mg/l and dilution rate  $0.02\text{hr}^{-1}$  under dark conditions. *Rp. palustris* "4" has been used in the treatment of wheat starch effluent. The result for COD reduction reached 91.7 percent. This experiment was operated under sunlight in daytime and lamplight at night. The dilution rate was  $0.014\text{ hr}^{-1}$ . This culture was carried out at opened and agitated vessel in deep medium. It was found that impact on results of treatment occurred at the lower dilution rates ( $D=0.003-0.005\text{ hr}^{-1}$ ) and higher dilution rates ( $D=0.3\text{ hr}^{-1}$ ).

The growth of photosynthetic bacteria can be determined by measuring the optical density of the culture broth at wavelength of 660nm. An approximate linear relationship between reduction of COD and cell mass was observed in this investigation.

12949  
CSO: 4009/231

Environmental Sciences

AUTHOR: None

ORG: Chinese Research Academy of Environmental Sciences, et al

TITLE: "A Study of Photochemical Smog Pollution and Its Control Strategies at Xigu District of Lanzhou City"

SOURCE: Beijing ZHONGGUO HUANJING KEXUE [ENVIRONMENTAL SCIENCES IN CHINA] in Chinese No 2, 21 Apr 85 pp 1-12

TEXT OF ENGLISH ABSTRACT: Since 1974, photochemical smog pollution has been observed at the Xigu district of Lanzhou City in the summer and fall. During the 1981-1983 period, the regional field measurements of primary and secondary pollutants combined with the meteorological parameters and the simulation studies of the smog formation by using both the indoor and outdoor smog chambers were conducted. The present status of the photochemical smog pollution and the meteorological background of this district have been studied. The mesoscale transport of photochemical smog and the ozone-raised phenomena after rain were observed and discussed. An ambient air quality model which describes the temporal and spatial distribution of the pollutants has been developed and compared with the observed data. A control strategy was suggested.

12949

CSO: 4009/231

AUTHOR: CHE Denke [6058 4098 4430]  
WU Jiongshen [0702 7486 4141]  
ZHU Shiguan [2612 4258 3123]  
YUAN Junqian [5913 0193 6197]

ORG: Lanzhou University

TITLE: "DJS-130 Computer CAMAC-Fiber Optics Closed Loop Analog Control System for Beam of 300KEV Neutron Generator"

SOURCE: Lanzhou LANZHOU DAXUE XUEBAO (ZIRAN KEXUE BAN) [JOURNAL OF LANZHOU UNIVERSITY (NATURAL SCIENCE EDITION)] in Chinese Vol 20, No 2, 28 Jun 84 pp 58-61

TEXT OF ENGLISH ABSTRACT: In order to steady the beam of 300KEV neutron generator a closed loop analog control system for ion source has been designed. The control system is composed of DJS130 Computer, CAMAC modules and fiber optics. The functions of the system are:  
(1) real time taking sample for source parameters  
(2) real time adjusting source parameter  
(3) to change parameters according to the requirement

12949  
CSO: 4009/1004

Fiber Optics

AUTHOR: CHE Dengke [6058 4098 4430]  
ZHU Shiguan [2612 4258 3123]  
YUAN Junqian [5913 0193 6197]

ORG: Lanzhou University

TITLE: "The Computer Data Acquisition System for Transfer Analog Impulses  
Using Fiber Optics"

SOURCE: Lanzhou LANZHOU DAXUE XUEBAO (ZIRAN KEXUE BAN) [JOURNAL OF LANZHOU  
UNIVERSITY (NATURAL SCIENCE EDITION)] in Chinese Vol 20, No 2, 28 Jun 84 pp  
62-66

TEXT OF ENGLISH ABSTRACT: In this work the computer data acquisition system  
is designed and discussed. In this system an analog impulse is transferred  
through fiber optics and used to control neutron generator. Data acquisition  
test has been done successfully on 150KEV neutron generator. The transfer  
precision is less than 1%. This technique can be applied to closed loop  
control system under stronger magnetic field interferences of data transfer  
system.

12949  
CSO: 4009/1004

AUTHOR: HE Xiaoyu [0149 1321 3254]  
YU Runlin [5713 3387 2651]  
WANG Ling [3769 3781]  
WU Baoshan [0702 1405 0810]  
XUAN Jiangong [1357 1696 0501]

ORG: Luoyang Tractor Research Institute and Lanzhou University

TITLE: "Influence Laser Treatment on Brittleness of Boronizing Layer"

SOURCE: Lanzhou LANZHOU DAXUE XUEBAO (ZIRAN KEXUE BAN) [JOURNAL OF LANZHOU UNIVERSITY (NATURAL SCIENCE EDITION)] in Chinese Vol 20, No 2, 28 Jun 84 pp 22-38

TEXT OF ENGLISH ABSTRACT: The form and influential factors of brittleness breakdown have been analyzed. And all methods of improving boronizing brittleness have been compared and summed up.

The authors have studied emphatically the influence laser treatment on brittleness of boronizing layer. The conclusion arrived is as follows:

1. The laser treatment is an effective method for improving brittleness of boronizing layer. The toughness can be increased by 11.5-49.3%; The fracture strength added by 17.3-33.1%; The stripping brittleness reduced by 27.8-51.0%.
2. Using the votex delectational technology, the crack-point of boronizing layer can be accurately and reliably measured. In cooperation with the test of materials, the toughness and fracture strength can be measured. Using the grinding method, the stripping brittleness of boronizing layer can be determined.
3. The fundamental reason for using laser treatment to improve brittleness of boronizing layer is that the boronide refinement grain and the lower hardness eutectic structure are obtained. So the distribution of residual microstress of surface is changed.

12949  
CSO: 4009/1004

AUTHOR: ZHAO Yanzen [6392 3061 2528]  
WU Shaomin [0124 1421 2494]  
et al

ORG: Institute of Atmospheric Physics, Academia Sinica

TITLE: "An Electro-optically Fast Tuning Ruby Laser for Water Vapor Sounding in Atmosphere"

SOURCE: Shanghai ZHONGGUO JIGUANG [CHINESE JOURNAL OF LASERS] in Chinese Vol 12, No 4, 20 Apr 85 pp 213-220

TEXT OF ENGLISH ABSTRACT: An electro-optically fast-tuning ruby laser, which consists of a calcite-KDP crystal as the fast-tuning component and a Fabry-Perot resonant frequency selector as the fine wavelength controller, has been developed for a differential absorption lidar (DIAL) system for water vapor sounding in the atmosphere. The laser has stepwise tuning characteristics and emits two pulses in a single shot, with the first pulse tuned at the center of an absorption line of the water vapor and the second one in the nearby valley. Operation theory and tuning characteristics of the laser are discussed in detail.

12949  
CSQ: 4009/226

Laser

AUTHOR: YANG Benqi [2799 2609 4388]  
JIN Linfa [6855 2651 3127]  
ZHANG Hongfen [4545 1347 5358]

ORG: Shanghai Institute of Optics and Fine Mechanics, Academia Sinica

TITLE: "Broadband Coatings in Etalon Used for Laser Beams"

SOURCE: Shanghai ZHONGGUO JIGUANG [CHINESE JOURNAL OF LASERS] in Chinese Vol 12, No 4, 20 Apr 85 pp 237-241

TEXT OF ENGLISH ABSTRACT: Broadband coatings in etalon used for laser beams are designed with  $\lambda/4$  coatings. The dispersion of refractive indices for coating materials are considered. Reflectance is 95±3% in the wavelength region from 410nm to 710 nm.

12949

CSO: 4009/226

Laser

AUTHOR: JIN Deyun [6855 1795 6663]  
HUANG Guosong [7806 0948 2646]  
ZHOU Fuzheng [0719 1788 2973]

ORG: Shanghai Institute of Optics and Fine Mechanics, Academia Sinica

TITLE: "Study of Dye Mode-locking of Repetition Pulse Laser"

SOURCE: Shanghai ZHONGGUO JIGUANG [CHINESE JOURNAL OF LASERS] in Chinese Vol 12, No 4, 20 Apr 85 pp 225-227

TEXT OF ENGLISH ABSTRACT: Using short resonator and the time expander with a resolution of 10 ps the effect of pumping energy, concentration and flow speed of the dye on the mode-locked pulse-width is studied. At a repetition rate of 10 to 20 Hz, we have obtained the output of stable mode-locked pulses. The satellite pulse and mismatching have not been observed. The fluctuation of the pulse amplitude is less than 10 percent.

12949

CSO: 4009/226

Laser

AUTHOR: ZHUANG Qi [8369 3823]  
HUANG Ruiping [7806 3843 1627]  
et al

ORG: Dalian Institute of Chemical Physics, Academia Sinica

TITLE: "Generation of NF ( $b'$   $\Sigma^+$ ) in the F-F<sub>2</sub>-NH<sub>3</sub> System Via a Supersonic Regime--A Potential Visible Chemical Laser Medium"

SOURCE: Shanghai ZHONGGUO JIGUANG [CHINESE JOURNAL OF LASER] in Chinese Vol 12, No 4, 20 Apr 85 pp 221-224

TEXT OF ENGLISH ABSTRACT:

By using a remodeled supersonic CW HF chemical laser, the direct production of electronically excited species NF ( $b'$   $\Sigma^+$ ) becomes feasible in the F-F<sub>2</sub>-NH<sub>3</sub> system. This is most likely accomplished via the mechanism proposed by Hack, et al plus the V-E energy transfer process NF( $a'$   $\Delta$ ) + HF(v)  $\rightarrow$  NF( $b'$   $\Sigma^+$ ) + HF. The intensity distribution on NF  $b'$   $\Sigma^+$   $\rightarrow$  X $^3$   $\Sigma^-$  emission along the gas flow direction, as well as the quenching rate constants of NF( $b'$   $\Sigma^+$ ) by NH<sub>3</sub> and DF are obtained.

12949

CSO: 4009/226

Laser

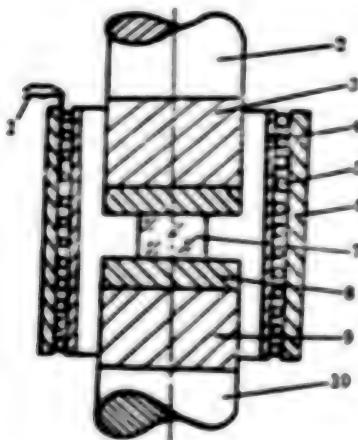
AUTHOR: CHUAN Ningsan [2617 1337 0005]  
CHENG Guochuan [7115 0948 2617]

ORG: Shanghai Institute of Optics and Fine Mechanics, Academia Sinica

TITLE: "Preparation and Characteristics of Polycrystalline KCl Used as Infrared Laser Windows"

SOURCE: Shanghai ZHONGGUO JIGUANG (CHINESE JOURNAL OF LASERS) in Chinese Vol 12, No 4, 20 Apr 85 pp 228-232

TEXT OF ENGLISH ABSTRACT: Fully dense polycrystalline KCl laser window can be obtained by hot forging technique. The optical properties of polycrystalline KCl are essentially unchanged compared with the starting single crystals. The mechanical strength of polycrystalline KCl depends upon the processing parameters used in hot-forging. Cleavage occurred in single crystal can be avoided in the polycrystalline KCl for laser windows.



12949

CSO: 4009/226

Laser

AUTHOR: PAN Chengming [3382 2052 2494]  
ZHANG Shugan [1728 2885 1626]  
ZHU Daqing [2612 1129 1987]

ORG: Shanghai Institute of Optics and Fine Mechanics, Academia Sinica

TITLE: "Study of Neutron Emission From Laser-plasmas"

SOURCE: Beijing WULI XUEBAO [ACTA PHYSICA SINICA] in Chinese Vol 33, No 1, Jan 84 pp 1-8

TEXT OF ENGLISH ABSTRACT: The characteristics of neutron emissions from laser-plasmas have been studied. Targets in the form of plane and spherical pellet were made of thermonuclear material containing deuterium, and irradiated by single beam laser system with pulse duration of the order of ns and six-beam laser systems with pulse duration of the order of ns and sns respectively.

12949

CSO: 4009/229

AUTHOR: ZHAO Zhen [6392 6966]

ORG: Lanzhou University

TITLE: "A Discussion on the Graphic Minimization and Decomposition of Multi-variable Fuzzy Logic Functions"

SOURCE: Lanzhou LANZHOU DAXUE XUEBAO (ZIRAN KEXUE BAN) [JOURNAL OF LANZHOU UNIVERSITY (NATURAL SCIENCE EDITION)] in Chinese Vol 20, No 2, 28 Jun 84 pp 39-48

TEXT OF ENGLISH ABSTRACT: It is a difficult task to minimize or to decompose a fuzzy logic function with more than four variables. In this paper, a graphic algorithm is suggested to overcome this difficulty. It is an extension of our previous work by using a kind of extended Karnaugh map.

12949

CSO: 4009/1004

AUTHOR: QIAN Weizhang [6929 0251 7022]  
CHEN Shanlin [7115 1472 2651]

ORG: QIAN of Shanghai University of Technology, Shanghai; CHEN of Chongqing Institute of Architectural Engineering, Chongqing

TITLE: "The Solution of Large Deflection Problem of Thin Circular Plate by the Method of Composite Expansion"

SOURCE: Chongqing YINGYONG SHUXUE HE LIXUE [APPLIED MATHEMATICS AND MECHANICS] in Chinese Vol 6, No 2, Feb 85 pp 103-119

TEXT OF ENGLISH ABSTRACT: The method of composite expansion in perturbation theory is used for the solution of large deflection problem of thin circular plate. In this method, the outer field solution and the inner boundary layer solution are combined together to satisfy all the boundary conditions. Hencky's membrane solution is used for the first approximation in outer field solution, and then the second approximate solution is obtained. The inner boundary layer solution is found on the bases of boundary layer coordinate. The reciprocal ratio of maximum deflection and thickness of the plate is used as the small parameter. The results obtained showed a vast improvement over that of the 1948 paper by Qian Weizhang ["Asymptotic Behavior of a Thin Clamped Circular Plate Under Uniform Normal Pressure at Very Large Deflection," SCIENCE REPORTS (A), NATIONAL TSING HUA UNIVERSITY, Vol 5, No 1, 1948 pp 1-24].

AUTHOR: XU Yuesheng [6079 6460 3932]

ORG: Department of Computer Science, Zhongshan University, Guangzhou

TITLE: "Recurrence Formula for B-Splines With Respect to a Class of Differential Operators"

SOURCE: Chongqing YINGYONG SHUXUE HE LIXUE [APPLIED MATHEMATICS AND MECHANICS] in Chinese Vol 6, No 3, Mar 85 pp 271-275

TEXT OF ENGLISH ABSTRACT: In this paper, we give recurrence formula for normalized B-splines with respect to standard system  $\{\varphi_{i-1}^n(x)\}_{i=1}^n$  which is the basic sets of solutions to a class of differential operators from the standpoint of generalized divided difference-Green function-B-splines.

AUTHOR: XIA Delin [1115 1795 7792]

ORG: Huazhong Institute of Technology, Wuhan

TITLE: "A New Method of Integer Linear Programming--Branch Direction Search Method"

SOURCE: Chongqing YINGYONG SHUXUE HE LIXUE [APPLIED MATHEMATICS AND MECHANICS] in Chinese Vol 6, No 3, Mar 85 pp 277-284

TEXT OF ENGLISH ABSTRACT: An endeavor is made to present a new and simple ILP [integer linear programming] algorithm for optimization. It has the most desirable features of robustness and fast convergence. The algorithm is successful in applying it to the same problems arisen in engineering design.

AUTHOR: QIAN Zhonghan [6929 6988 7281]

ZHOU Qijian [0719 0366 7003]

HU Xiheng [5170 6932 1854]

ORG: QIAN of Nanjing Institute of Technology; ZHOU of Chongqing University; HU of Guizhou Institute of Technology

TITLE: "An Investigation on the Mechanism and Technique of Order-Reduction of Mathematical Models"

SOURCE: Beijing ZIDONGHUA XUEBAO [ACTA AUTOMATICA SINICA] in Chinese Vol 11, No 1, Jan 85 pp 44-52

TEXT OF ENGLISH ABSTRACT: An attempt is made to probe into both the mechanism and some new computational methods of model-reduction. The principle of an optimal allotment of information resources in a reduced-order model and the technique of separate treatment for middle-frequency and low-frequency ranges are presented. Several methods and algorithms based upon these concepts are offered. Results of computation show convincingly that these new methods of model-reduction are superior to the current methods from the point of view of a better similitude to the original model over a wide-range of frequencies. They are also simple to use and versatile in engineering applications.

AUTHOR: WANG Guangxing [3769 0342 5281]

ORG: Northeast Institute of Technology

TITLE: "Noise Analysis of Soft Errors in Multiple Output Combinational Logic Systems"

SOURCE: Beijing ZIDONGHUA XUEBAO [ACTA AUTOMATICA SINICA] in Chinese Vol 11, No 1, Jan 85 pp 80-86

TEXT OF ENGLISH ABSTRACT: Using two dimensional Walsh-Hadamard Transform performance of probability of errors caused by soft noise for general multiple output combinational logic systems is analyzed. Simplified equations and a fast new algorithm for computing the probability of errors caused by soft noise to some specific cases and the general case, the SUM-OF-PRODUCT and NAND-NAND model are obtained. Several examples have been considered by the use of computer codes. It reveals the characteristics of the probability of errors caused by soft noise and provides some useful prompt for the design of multiple output combinational logic systems.

CSO: 4009/1044

AUTHOR: HONG Jiazen [3163 0857 2128]

ORG: Shanghai Jiaotong University

TITLE: "Nutation Damping of Spinning Satellite With Annular Damper"

SOURCE: Beijing LIXUE XUEBAO [ACTA MECHANICA SINICA] in Chinese Vol 16, No 6, Nov 84 pp 605-614

TEXT OF ENGLISH ABSTRACT: A new assumption, that the fluid in an annular damper is supposed to be a variable slug, is taken to discuss the nutation damping of a spinning satellite with a partially filled viscous annular damper. The dynamical equations for the spinning satellite with the annular damper are established by applying the equations of the first order in normal form for the rigid body.

Approximate analytical solutions of nutation angle attenuation are obtained by the iteration and the small parameter methods.

The theoretical results from the variable slug can explain the experimental phenomena, which are not explainable by the results from the unvarying slug, taken by most of the former references. Thus the analytical solutions presented provide more reliable basis for designing the annular damper.

12949

CSO: 4009/227

Mechanics

AUTHOR: ZHUANG Fengqing [8369 1496 7230]

ORG: Institute of Mechanics, Academia Sinica

TITLE: "Diffraction of Strong Detonation Waves by a Moving Three-dimensional Thin Body"

SOURCE: Beijing LIXUE XUEBAO [ACTA MECHANICA SINICA] in Chinese Vol 16, No 6, Nov 84 pp 562-569

TEXT OF ENGLISH ABSTRACT: An analytical solution is obtained for the diffraction of a strong detonation wave by a three-dimensional thin body moving in the opposite direction. The planiform and the thickness distribution of the body can be arbitrary and the speed of the body can be either supersonic or subsonic relative to the undisturbed stream ahead of the wave or behind the wave. The solution is a generalization of the previous solution of Ting and Gunzburger for the shock diffraction.

12949

CSO: 4009/227

AUTHOR: FU Xianluo [0265 0341 5012]

ORG: Institute of Mechanics, Academia Sinica

TITLE: "Analysis On Nutation Damping of Freely Precessional Gyroscope"

SOURCE: Beijing LIXUE XUEBAO [ACTA MECHANICA SINICA] in Chinese Vol 17, No 2, Mar 85 pp 177-181

TEXT OF ENGLISH ABSTRACT: A nonlinear system which consist of a gyroscope to have two precessional degree of freedom and a ring nutation damper partially filled with a viscous fluid is approximately described by second order linear differential equations with constant coefficents in this paper. A mathematical model of a nutational motion of the system with small nutation angle is established. The equations of the gyroscopic motion at both excited and nutational damping are solved, and analytical expressions characterizing the motion of gyroscope rotor are obtained. Expressions for determining the damping time and frequency characteristic are given. It is shown that the damping time characteristic of the system depends mainly on the damping moment of force acting on the gyroscope rotor by the liquid and that the frequency characteristic of the system depends mainly on the change of the moment of momentum of the gyroscopic rotor which the moving liquid causes to change. The formulae given here are applied to a particular rotor-damper system, the results obtained are agreeable to the experimental data.

12949  
CSO: 4009/242

Mechanics

AUTHOR: GONG Ye [1362 6851]  
MA Tengcai [7456 7506 2088]

ORG: Southwestern Institute of Physics, Leshan, Sichuan

TITLE: "Numerical Method for Solving the Non-linear Evolution of Tearing Modes"

SOURCE: Beijing LIXUE XUEBAO [ACTA MECHANICA SINICA] in Chinese Vol 17, No 2, Mar 85 pp 127-134

TEXT OF ENGLISH ABSTRACT: A numerical method developed to study the non-linear evolution of tearing modes in tokamaks is described in this paper. Eignenfunction is stepped implicitly by the alternating-direction method; at the forward time can be found by inverting a tridiagonal matris. Forward and backward differences are selected accordingly in order to be diagonally dominant for using LU method. Calculations are performed for the  $m=2$  tearing mode. Numerical results show a good agreement with physical analysis.

12949

CSO: 4009/242

Mechanics

AUTHOR: HUANG Lanjie [7806 5695 3381]

ORG: Computer Center, Academia Sinica

TITLE: "Calculation of Supersonic Steady-state Flow in Axisymmetric Nozzles With an Upwind Difference Scheme"

SOURCE: Beijing LIXUE XUEBAO [ACTA MECHANICA SINICA] in Chinese Vol 17, No 2, Mar 85 pp 106-113

TEXT OF ENGLISH ABSTRACT: This paper is on an application of the upwind difference scheme proposed by the author in a previous paper. The properties of the steady-state Euler equations for axisymmetric flow are stated; the interior upwind difference equation and the corresponding boundary difference equation are discussed, they are in a sense approximations of the characteristic relations. The discussion also includes calculation of discontinuous solutions with weakly conservative schemes and improvement of the entropy phenomenon for shock reflection on boundaries.

12949

CSO: 4009/242

Mechanics

AUTHOR: CHAO Guoying [6392 0948 5391]

ORG: Institute of Mechanics, Chinese Academy of Sciences

TITLE: "Calculation of Hypersonic Wake and Its Optical Characteristics of a Slightly Blunted Cone"

SOURCE: Beijing LIXUE XUEBAO [ACTA MECHANICA SINICA] in Chinese Vol 17, No 2, Mar 85 pp 114-121

TEXT OF ENGLISH ABSTRACT: A difference method is applied to the system of equations governing the axisymmetric hypersonic wake which is not in chemical equilibrium. An explicit difference scheme in von Miss coordinates is designed to cancel the "numerical singularity" on the axis. A new method for determination of the initial conditions of the flow near the neck is proposed. The resulting wake ionization decay rate is in excellent agreement with the experiment, and we find that most of the radiation from the wake is infrared.

12949

CSO: 4009/242

AUTHOR: ZHOU Ciqing [0719 2945 7230]  
QIU Yiyuan [8002 4135 0337]

ORG: Both of Department of Mathematics and Mechanics, South China  
Institute of Technology, Guangzhou

TITLE: "Elastic-Plastic Analysis of Cylindrically Orthotropic Composite  
Thick-Walled Tube"

SOURCE: Chongqing YINGYONG SHUXUE HE LIXUE [APPLIED MATHEMATICS AND  
MECHANICS] in Chinese Vol 6, No 3, Mar 85 pp 239-246

TEXT OF ENGLISH ABSTRACT: In the present paper, Tsai-Hill yield criterion  
in a state of plane strain is derived for incompressible and compressible  
materials respectively. The elastic-plastic stress and displacement fields  
of cylindrically orthotropic composite thick-walled tube under uniform  
radial pressure are studied. The formulas of the yield pressure, limit  
pressure and region of shakedown are obtained.

AUTHOR: SHEN Huishen [3088 1920 3947]

ORG: Shanghai Jiaotong University, Shanghai

TITLE: "Perturbation Solution of Axisymmetric Plastic Problem  
I--Necking of a Bar"

SOURCE: Chongqing YINGYONG SHUXUE HE LIXUE [APPLIED MATHEMATICS AND  
MECHANICS] in Chinese Vol 6, No 4, Apr 85 pp 345-357

TEXT OF ENGLISH ABSTRACT: In this paper, basing on the general equations  
of axisymmetric plastic problems deduced in ref. [11],\* and employing  
perturbation technique, the asymptotic analysis for the necking problem is  
given. The result will provide knowledge of distribution of stress and  
strain in the whole plastic region, thus, it will lead to a better under-  
standing of the necking phenomena in a tension specimen, such as cup-and-  
cone fracture.

\*Shen Huishen, YINGYONG SHUXUE HE LIXUE [APPLIED MATHEMATICS AND MECHANICS]  
Vol 5, No 4, Jul 84 pp 577-582.

AUTHOR: WANG Maohua [3076 2021 7520]

ORG: Beijing Institute of Aeronautics and Astronautics, Beijing

TITLE: "On the Correction by McClintock and Irwin"

SOURCE: Chongqing YINGYONG SHUXUE HE LIXUE [APPLIED MATHEMATICS AND MECHANICS] in Chinese Vol 6, No 4, Apr 85 pp 377-381

TEXT OF ENGLISH ABSTRACT: In the case of quasi-brittle fracture, at the crack tip there is a small plastic region whose affection cannot be neglected. Therefore the linear elastic asymptotic fields must be corrected. In 1965 F. A. McClintock and G. R. Irwin presented a correction which since then has been adopted extensively. Here in this paper, it must be pointed out that such correction is wrong. A correct result is given.

CSO: 4009/1045

AUTHOR: WANG Shuchun [3769 0647 3196]

ORG: Tianjin Sanitation and Anti-epidemic Station, Tianjin

TITLE: "Determination of Poisonous Seeds in Cereals"

SOURCE: Beijing ZHONGHUA YUFANG YIXUE ZAZHI [CHINESE JOURNAL OF PREVENTIVE MEDICINE] in Chinese No 5, 25 Sep 84 pp 268-269

TEXT OF ENGLISH ABSTRACT: Identification and quantitative methods of poisonous seeds in cereals are described. *Semen stramonii* is identified by seed morphology, Vitali's chemical reaction and thin layer chromatography (TLC). Ergota is identified by morphology, chemical reaction of ergota pigment and functional group of indole reaction. *Selerotinia selerotiorum* Lib and ergota are very similar in appearance, so identifying methods on morphology, chemistry and cut sections of tissues for microscopic examination are needed. *Lolium* is mainly identified by morphology. The origin of three kinds of poisonous seeds and pictures of specimens are provided.

12949

CSO: 4009/236

AUTHOR: WU Jian [0702 0679 1344]  
CHEN Kaixian [7115 0418 0341]  
JI Ruyun [1518 3067 6663]

ORG: Shanghai Institute of Materia Medica, Chinese Academy of Science, Shanghai

TITLE: "A Quantum Pharmacological Study of the New Antiarrhythmic Agent Changrolin and Its Analogue"

SOURCE: Wuchang FENZI KEXUE YU HUAXUE YANJIU [JOURNAL OF MOLECULAR SCIENCE] in Chinese No 4, Dec 84 pp 463-464

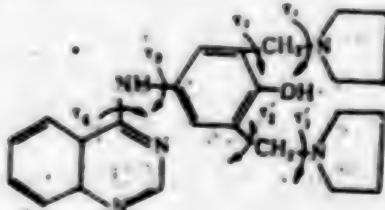
TEXT OF ENGLISH ABSTRACT: Changrolin, 4-3', 5'-bis (N-pyrrolidinyl) methyl-4'-hydroxanilinoquinazoline, is a novel antiarrhythmic agent developed in our institute. Various analogues were synthesized, and their antiarrhythmic activities were estimated. In the present work the optimization conformat ion of Changrolin has been calculated and the correlation between the pharmacological effects and EHMO calculations has been discussed. The following equations were derived by the regression of the data obtained.

$$\log 1/c_1 = 13.88 - 6.32(E_{\text{HOMO}} - E_{\text{LOMO}})$$

n = 5; r = 0.986; s = 0.136

$$\log 1/c_1 = 15.70 - 7.05(E_{\text{HOMO}} - E_{\text{LOMO}})$$

n = 5; r = 0.941; s = 0.205



where  $E_{\text{HOMO}}$  is the energy level of the highest occupied molecular orbital;  $E_{\text{LOMO}}$  is that of the lowest occupied one;  $c_1$  represents the value of the experiments done in mice, and  $c_2$ , that done in rats respectively.

12949  
CSO: 4009/110

AUTHOR: YAN Xiaoyan [2518 2556 3543]  
LI Nong [2621 4487]

ORG: YAN of China Central TV University and LI of the Computer Center,  
Qinghua University

TITLE: "A Method for Getting the Initial Feasible Solution of Linear  
Programmings"

SOURCE: SHUZHI JISUAN YU JISUANJI YINGYONG [JOURNAL ON NUMERICAL METHODS AND  
COMPUTER APPLICATIONS] in Chinese Vol 5, No 3, Sep 84 pp 167-177

TEXT OF ENGLISH ABSTRACT: A new method for finding a basic feasible solution  
of linear programmings was suggested. Its main point is to change the problem  
into finding an inverse of a matrix. In general, the amount of calculation  
can be greatly reduced, and the numerical stability can be reinforced.

12949

CSO: 4009/1018

AUTHOR: YAO Jun'en [1202 7468 1869]  
YANG Kai [2799 0418]

ORG: Shanghai Institute of Optics and Fine Mechanics, Academia Sinica

TITLE: "Magnetic Field Superimposed Field Emission Electron Gun System"

SOURCE: Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese Vol 5, No 4, Apr 85 pp 348-355

TEXT OF ENGLISH ABSTRACT: By using a simplified electrostatic sphere on core diode model (SOC) the relative spherical aberration coefficients  $C_r$  of the magnetic field superimposed field emission gun (MFFEG) were numerically calculated. Here  $C_r$  is the objective side spherical aberration coefficient normalized with respect to the spherical aberration coefficient in the absence of magnetic field, it provides a measure of the additional factor by which the electron source size is degraded as a result of the superimposition of the magnetic focusing field. The position of the real image (the electron probe) could be adjusted easily by changing the exciting strength of the magnetic fields. The  $C_r$  of bell shaped magnetic field has the least value among these 6 theoretical fields. Calculation suggested that the spherical aberration of this MFFEG system could be less than a pure field emission gun followed by a separate magnetic condenser lens. As an illustration, the MFFEG system with 10 mm magnetic field width could produce a beam crossover of 1 $\mu$ m diameter (limited by spherical aberration) at 200mm from the cathode, leaving a large free space around the specimen, for surface current density of  $1.0 \times 10^{10} \text{ A/m}^2$ , the current into the crossover would be approximately 8  $\mu$ A.

12949  
CSO: 4009/251

Optics

AUTHOR: CHEN Shuchun [7715 6615 2504]  
DAI Fengmei [2071 7364 1188]

ORG: Shanghai Institute of Optics and Fine Mechanics, Academia Sinica

TITLE: "Studies of Laser-excited Site-selective Spectra for Eu<sup>3+</sup> Ions in La-phosphate Glass"

SOURCE: Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese Vol 5, No 4, Apr 85 pp 325-330

TEXT OF ENGLISH ABSTRACT: Site-selective spectra of Eu<sup>3+</sup> ions in the La-phosphate glass were measured using laser-induced fluorescence linenarrowing technique. The excitation source was a flashlamp pumped Rhodamine tunable dye laser. In the experiment four main kinds of site-selective spectra with the remains of inhomogeneously broadening were obtained. these site-selective spectra fit to conventional spectrum measured at 77K for  $^5D_0 - ^7F_1$  transition of Eu<sup>3+</sup>, and favourable result has been obtained.

12949  
CSO: 4009/251

Optics

AUTHOR: LIU Huimin [0491 1979 3046]  
GAN Fuxi [1626 1607 3538]

ORG: Shanghai Institute of Optics and Fine Mechanics, Academia Sinica

TITLE: "Time-resolved Fluorescence Spectra of Titanium-contained Fluorophosphate Glass"

SOURCE: Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese Vol 5, No 4, Apr 85 pp 319-324

TEXT OF ENGLISH ABSTRACT: The absorption, fluorescence and excitation spectra of titanium-contained fluorophosphate glass have been measured. The results show that  $Ti^{3+}$  ions in the glass are located at disordered octahedral sites. With UV 250~320nm excitation of the charge transfer band a visible  $0.55\mu m$  luminescence has been observed. The band-width is 180nm. In the excitation spectrum the peak position is located at 290nm. Furthermore, time-resolved fluorescence and relaxation spectra of  $Ti^{3+}$  ions in the glass have been measured at room temperature and 77K, respectively. It is found that the fluorescence peak positions move from 510nm to longer wavelength 640nm at liquid nitrogen temperature and the spectra become diffused with the increase of delay time up to 30 $\mu s$ , while a little change occurs in the spectra at room temperature.

The fluorescence life-times of 5~12 $\mu s$  at low temperature are dependent upon the emission wavelengths. On the contrary, they are 13 $\mu s$  and independent upon the emission wavelengths at room temperature.

In addition, the condition and possibility of the emission of  $Ti^{3+}$  ions in inorganic glass are discussed.

12949  
CSO: 4009/251

Optics

AUTHOR: CHEN Jianwen [7715 1696 2429]  
FU Shufen [0265 3219 5358]  
ZHANG Dake [1728 1129 0668]

ORG: Shanghai Institute of Optics and Fine Mechanics, Academia Sinica

TITLE: "A Free Electron Laser with Linealy Polarized Wiggler and Axial Magnetic Field"

SOURCE: Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese Vol 5, No 4, Apr 85 pp 304-309

TEXT OF ENGLISH ABSTRACT: Using a classical single particle model of free electron laser, the effects of a uniform axial magnetic field on the gain of a free electron laser with linearly polarized wiggler were discussed. Gain enhancement near magnetic resonance was obtained.

12949

CSO: 4009/251

AUTHOR: CHEN Zongmao [7115 1350 2021]

ORG: Research Institute of Tea, Chinese Academy of Agricultural Sciences

TITLE: "A Comparative Study of Thin Film Photodegradative Rates for 35 Pesticides"

SOURCE: Dalian HUANJING KEXUE XUEBAO [ACTA SCIENTIAE CIRCUMSTANTIAE] in Chinese No 1, Mar 85 pp 70-84

TEXT OF ENGLISH ABSTRACT: The photodegradative rate constant and half-life for 35 pesticides (including organochlorine, organophosphorus, carbamate, triazine and pyrethroid pesticides) at three concentration levels (0.67, 3.3 and  $6.7\mu\text{g}/\text{cm}^3$ ) were determined at the environmentally important wavelengths. The rate constants range from  $265.2 \pm 12.8 \times 10^{-7}\text{s}^{-1}$  (Dichlorvos,  $0.67\mu\text{g}/\text{cm}^2$ ) to  $9.3 \pm 1.2 \times 10^{-7}\text{s}^{-1}$  (p,p'-DDE,  $0.67\mu\text{g}/\text{cm}^2$ ). The rate constants began to decrease when concentration of the pesticides on glass plates reached a certain level on the plates. There were found no significant relationships between the extinction coefficients at 295-305nm and the photodegradation rate for the pesticides.

12949

CSO: 4009/235

AUTHOR: ZHANG Yuheng [1728 5940 1854]  
LI Yuzhi [2621 3768 5347]  
ZHENG Jiefei [6774 2212 7378]

ORG: Department of Physics, University of Science and Technology of China,  
Hefei

TITLE: "The Step Structure Effect of DC Josephson Current Within One Flux  
Quantum Period (I)"

SOURCE: Beijing WULI XUEBAO [ACTA PHYSICA SINICA] in Chinese Vol 33, No 1, Jan  
84 pp 58-68

TEXT OF ENGLISH ABSTRACT: If a SQUID consisting of two functions is placed in a cavity with sufficiently high Q-value, when the Josephson frequency of the junction  $\omega = 2eV/h$  equals to one of the eigenfrequencies  $\omega_n$  of the cavity, then the oscillating electromagnetic field in the form of standing wave excited by the junction current would react on the junctions and produce a series of steps of dc Josephson current within one flux quantum period  $\Phi_0$ .

The theory also predicts that a series of new superconducting quantum interference phenomena would be produced by Josephson currents of two junctions in the feed back field. The step height of the Josephson current will be increased when both functions are placed separately at the peak of the standing wave. The phase of the interference trace of SQUID will change by  $\pi/2$  when one of the junctions is placed at the peak and the other is placed at the trough. The I-H trace of SQUID will degenerate to that of a single junction when one of the junctions is placed at the peak and the other is placed at the node. The step will not occur except that with  $n=0$  when both junctions are placed separately at nodes.

12949  
CSO: 4009/229

Physics

AUTHOR: WANG Zhaoshen [3769 0340 3947]  
WANG Yamin [3076 0068 3049]

ORG: Institute of Plasma Physics, Academia Sinica, Hefei

TITLE: "Measuring Electron Cyclotron Radiation From Plasmas By Means of Confocal Resonator"

SOURCE: Beijing WULI XUEBAO [ACTA PHYSICA SINICA] in Chinese Vol 33, No 1, Jan 84 pp 47-52

TEXT OF ENGLISH ABSTRACT: A method of measuring electron cyclotron radiation from plasmas by using confocal resonant cavity and sweep frequency receiver is proposed. A radiation spectrum expression for a uniform plasma slab in the confocal resonant cavity has been derived. The analysis shows this method can independently measure TOKAMAK's electron temperature and its radial distribution. Furthermore, as a quasi-optical receiving system, it possesses high spatial resolution power.

12949

CSO: 4009/229

18 July 1985

Physics

AUTHOR: YANG Shuwen [2799 3219 7186]

ORG: Chengdu Institute of Radio Engineering

TITLE: "Propagating Beam Method of Optical Waveguide Coupling"

SOURCE: Beijing TONGXIN XUEBAO [JOURNAL OF CHINA INSTITUTE OF COMMUNICATIONS] in Chinese Vol 6, No 1, Jan 85 pp 71-76

TEXT OF ENGLISH ABSTRACT: The new method is presented for analyzing the coupling system of two gradient index optical waveguides. The propagating beam method and the normal mode technique are utilized conveniently to treat the coupling between two Gaussian beams, and to investigate the properties of energy exchange, beat, etc.

12949

CSO: 4009/1014

Physics

AUTHOR: LIANG Yi [2773 3015]  
JIAN Shuisheng [4675 3055 3932]

ORG: Northern Jiaotong University, Beijing, China

TITLE: "Analysis On Bragg Fibers"

SOURCE: Beijing TONGXIN XUEBAO [JOURNAL OF CHINA INSTITUTE OF COMMUNICATIONS]  
in Chinese Vol 6, No 1, Jan 84 pp 77-83

TEXT OF ENGLISH ABSTRACT: Bragg fiber was supposed to be a single mode fiber with large core diameter and to be strongly mode selective. But we haven't seen any detailed analysis on Bragg fibers so far. This paper determines the propagation constant and the increase of attenuation due to curvature of the axis of Bragg fibers. The conclusion is that it is impossible for Bragg fiber to be a single mode fiber or a mode fiber and that Bragg fibers seem to be very attractive as resonators of lasers.

12949  
CSO: 4009/1014

Physics

AUTHOR: SUN Weimin [1327 5998 3046]  
PENG Jihu [1756 0679 5706]

ORG: Qinghua University, Beijing, China

TITLE: "Two Dimensional Diffusion Analysis in Channel Optical Waveguides"

SOURCE: Beijing TONGXIN XUEBAO [JOURNAL OF CHINA INSTITUTE OF COMMUNICATIONS] in Chinese Vol 6, No 1, Jan 85 pp 84-89

TEXT OF ENGLISH ABSTRACT: Two dimensional density profiles in diffused channel optical waveguides are analyzed in detail based on two diffusion models. First, it extends the Hocker and Burns' result corresponding to isotropic dielectric media into anisotropic media and analyses the approximation condition. Secondly, it makes use of Tsonev's two-step diffusion model proposed for one dimensional diffusion analysis and gives a new analytical result of two dimensional diffusion. Comparisons between these two solutions are made while the results could be used to analyze waveguide modes and propagation constants, and to help determine the technological parameters of waveguide fabrication.

12949  
CSO: 4009/1014

Physics

AUTHOR: WANG Kaiban [3769 7030 2430]  
YE Peida [0673 1014 1129]

ORG: Beijing Institute of Posts and Telecommunications, Beijing, China

TITLE: "Polarization Noise in Monomode Fiber System"

SOURCE: Beijing TONGXIN XUEBAO [JOURNAL OF CHINA INSTITUTE OF COMMUNICATIONS]  
in Chinese Vol 6, No 1, Jan 85 pp 90-96

TEXT OF ENGLISH ABSTRACT: In this paper the mechanism of producing polarization noise in monomode fiber system is described first. Then SNR expressions of polarization noise with several imperfect joints and modified equation of power coupling efficiency through an imperfect joint are presented. In addition, approximate maximum and minimum SNR's are also estimated. From the theoretical analysis developed and experimental results obtained, it is evident that such noise is very small and can be neglected in practice.

12949  
CSO: 4009/1014

Physics

AUTHORS: NIE Yuxin [5119 3768 2500]  
ZHAO Lizeng [6392 3810 2582]

ORG: Both of Institute of Physics, Chinese Academy of Sciences

TITLE: "Short Wavelength Radiation Generation and Its Application"

SOURCE: Beijing WULI [PHYSICS] in Chinese Vol 14, No 2, Feb 85 pp 65-70

ABSTRACT: In recent years, we have seen more increasing demands on far-ultra-violet radiation and vacuum ultraviolet radiation; both kinds are short wavelength radiation. Its sources already developed and still under development can be divided into synchronous radiation, laser, and frequency conversion dye laser using nonlinear optical method. This paper presents the three above-mentioned types with emphasis on the latter. Applications of dye lasers have been extensive. Broader prospects of application of dye lasers will be forthcoming if its characteristics of modulability, narrow beam width, high power and short pulse (among others) can be shifted to the vacuum ultraviolet zone. With the application of coherent vacuum ultraviolet radiation in holography, discrimination power can be enhanced. In optical chemistry, especially in the synthesis of new materials with unique characteristics, vacuum ultraviolet radiation with modulability may become an important technology. Four figures show the ASRL principle and experimental layout, generation of tertiary harmonics, and an experiment for producing vacuum ultraviolet radiation. Three tables list the output wavelengths of various kinds of vacuum ultraviolet laser, as well as the experimental results of ASRL and vacuum ultraviolet radiation produced by the four-wave mixing frequency.

10424  
CSO: 4009/228

Physics

AUTHOR: PAN Jincai [3382 6855 2088]  
QIAN Guoxing [6929 0948 5281]

ORG: Both of Shanghai Silicate Chemistry Technology Institute, Chinese Academy of Sciences

TITLE: " $\text{Bi}_{12}\text{GeO}_{20}$  Crystal as Surface Acoustic Wave Temperature Sensors"

SOURCE: Beijing WULI [PHYSICS] in Chinese Vol 14, No 2, Feb 85 pp 86-87

ABSTRACT: Surface acoustic wave temperature sensors, newly announced, not only achieve the output of digital messages like a quartz temperature-sensing crystal, but also have desirable characteristics like high sensitivity and upper limit of frequency, good linearity, batch production feasibility, stability, reliability and less tendency to ageing. The paper presents a contact-type surface acoustic wave temperature sensor using  $\text{Bi}_{12}\text{GeO}_{20}$  monocristalline as the substrate material. The authors' work consists of a feasibility demonstration of the sensor, testing the frequency versus temperature characteristic curve, and a comparison with similar devices using the same type of monocrystals. One table lists the surface wave parameters of the crystals. Two figures show a surface wave delay linear type oscillator, and the frequency versus temperature characteristic of the temperature sensor under discussion. The authors express their gratitude to the First Shanghai Radio Plant for their assistance in the development and processing of  $\text{Bi}_{12}\text{GeO}_{20}$  monocrystals.

10424  
CSO: 4009/228

Physics

AUTHOR: LUO Zhengji [5012 2973 4764]  
XU Zuyan [6079 4371 1750]  
DENG Daojun [6772 6670 6746]  
DENG Lu [6772 7627]  
GUO Dongsheng [6753 2639 0581]  
LI Xiufang [2621 4423 5364]

ORG: All of Institute of Physics, Chinese Academy of Sciences

TITLE: "An Experiment of Vortex Stabilized Flash-lamp Pumped Dye Laser"

SOURCE: Beijing WULI (PHYSICS) in Chinese Vol 14, No 2, Feb 85 pp 99-100

ABSTRACT: The flash-lamp pumped dye laser is widely used because of its installation simplicity and high overall efficiency. However, the conventional flash-lamp has a short service life and low explosion threshold, so it is disadvantageous to operate at high power and high repetitions. The paper presents a vortex stabilized flash-lamp which can overcome the above-mentioned shortcomings to some extent; the flash-lamp can be used as an effective pumping source of dye lasers with long service life and high average power. The experiment of pumping a dye laser used Rh6G dye and an ethanol solution with a silver-coated condenser and a quartz dye tube. The laser output energy slowly increases with increase in argon gas pressure. Four figures show the experimental layout, relationship between laser output energy on the one hand, and argon gas pressure, dye tube internal diameter, and excitation energy, on the other.

10424

CSO: 4009/228

AUTHOR: QIU Xiaoming [6726 1321 2494]  
WU Jingsheng [0702 0079 3932]

ORG: QIU of the Southwestern Institute of Physics, Leshan, Sichuan and WU of the Institute of Physical Science and Technology, University of Maryland

TITLE: "Wu-Lee Criterion On Relativistic Loss-cone Instability"

SOURCE: Chongqing HEJUBIAN YU DENGIZITI WULI [NUCLEAR FUSION AND PLASMA PHYSICS] in Chinese Vol 5, No 1, Mar 85 pp 1-8

TEXT OF ENGLISH ABSTRACT: In the present paper, the difference between the relativistic resonance condition in momentum space and that in velocity space is pointed out. It has been proven that the difference is due to the nonlinear relation of the relativistic momentum to the velocity. Furthermore, a simple judgement of conditions on which the maximum growth rate may exist is discussed. It has been shown that for  $M^2 \cos^2\theta \ll 1$ , Wu-Lee criteria in both spaces yield the same result.

12949  
CSO: 4009/217

AUTHOR: QIAN Jiapu [6929 1367 3302]  
TAO Shihui [7118 1102 1979]  
SHAO Xianhua [6730 0341 5478]

ORG: Southwestern Institute of Physics, Leshan, Sichuan

TITLE: "A Hot Surface Ionization Detector"

SOURCE: Chongqing HEJUBIAN YU Dengliziti Wuli [NUCLEAR FUSION AND PLASMA PHYSICS] in Chinese Vol 5, No 1, Mar 85 pp 20-23

TEXT OF ENGLISH ABSTRACT: A hot surface ionization detector is described in this paper. The hot surface in the detector is made of tungsten filaments and the ion collector is a tungsten wire grid around the hot filaments. To prevent alkali metal vapor from condensing on the wires, the tungsten wires are heated to 400°C. The insulator among four electrodes of the detector is inserted in an enclosed metal envelope. By means of a labyrinth packing, an electric conducting layer cannot form on the insulator. The detector has been applied to quick measurement of the density of an alkali metal vapor jet. Some experimental results of the detector for a supersonic lithium vapor jet are given.

12949  
CSO: 4009/217

Plasma Physics

AUTHOR: WANG Huisan [3769 1920 0005]  
JIAN Guangde [4675 1639 1795]

ORG: Southwestern Institute of Physics, Leshan, Sichuan

TITLE: "Numerical Simulation for Optics of High Current Ion Beams Extracted From a Plasma"

SOURCE: Chongqing HEJUBIAN YU DENGIZITI WULI [NUCLEAR FUSION AND PLASMA PHYSICS] in Chinese Vol 5, No 1, Mar 85 pp 33-39

TEXT OF ENGLISH ABSTRACT: A numerical method simulating high current ion sources for neutral beam injection is given in this paper as well as its typical result. The examination of these results shows that this simulation reflects the most essential optical performance of the extraction systems in high current ion sources. Therefore, the optical system of high current ion beams can be studied and designed with the help of this method.

12949

CSO: 4009/217

AUTHOR: HUANG Lin [7806 2651]

ORG: Southwestern Institute of Physics, Leshan, Sichuan

TITLE: "Parametric Instabilities in an Ion Beam-plasma System"

SOURCE: Chongqing HEJUBIAN YU Dengliziti Wuli [NUCLEAR FUSION AND PLASMA PHYSICS] in Chinese Vol 5, No 1, Mar 85 pp 9-14

TEXT OF ENGLISH ABSTRACT: In this paper the electrostatic low-frequency parametric instability, excited by an external pump electric field  $E_0$  in an ion beam-plasma system, has been studied by the method of Fried et al. First, the general dispersion relation for the low frequency wave is derived. Then the excitation of parametric instabilities in a proton beam-plasma system is studied by means of the numerical method. The results show that the ion beam has an important influence upon the parametric instability excitation in plasma systems. In the absence of the ion beam, only one mode can be excited. Once an ion beam is introduced into the system, two waves with long wave length and low frequency are excited.

12949

CSO: 4009/217

AUTHOR: ZHAO Shiqing [6392 1102 0615]  
HU Guangrong [5170 1639 2837]  
ZHAO Shuyu [6392 3219 3768]

ORG: ZHAO Shiqing and HU both of the First People's Hospital, Fuxin Shi;  
ZHAO Shuyu of the Second People's Hospital, Fuxin Shi

TITLE: "Analysis of 575 Cases of Suicidal Behavior by Taking Poison"

SOURCE: Beijing ZHONGHUA SHENJING JINGSHENKE ZAZHI [CHINESE JOURNAL OF  
NEUROLOGY AND PSYCHIATRY] in Chinese No 2, 23 Apr 85 pp 72-75

TEXT OF ENGLISH ABSTRACT: In this article, 575 hospitalized cases of self-poisoning with drugs from 1980 to 1983 are reported. Of these cases, 7 percent occurred among patients with physical problems who were inpatients in the Department of Medicine, constituting 62.5 percent of all emergency cases happening during the same period. In addition, 73.1 percent of the cases were younger than 29 years of age, and 2.1 percent were older than 60.

The cases may be grouped according to the following: deliberate action (30.8 percent), impulsive action (34.4 percent) and attempted suicide (34.8 percent). The related psychological problems consisted of family stress (60.9 percent), trouble in love affairs (5.9 percent), interpersonal problems (8.3 percent) and mental or character disorders (3.8 percent).

The most common drugs used were hypnotics or tranquilizers (37.9 percent), organic phosphoric insecticides (25 percent), drugs for killing mice (7.8 percent) and analgesic agents (6.8 percent).

The various potential causes of self-poisoning with drugs are discussed.

**Psychiatry**

**AUTHOR:** DUAN Cunxin [3008 1317 0207]

**ORG:** Zhumadian Regional Psychiatric Hospital, Henan

**TITLE:** "Investigation of Psychotic Symptoms in 122 Cases of Affective Psychosis"

**SOURCE:** Beijing ZHONGHUA SHENJING JINGSHENKE ZAZHI [CHINESE JOURNAL OF NEUROLOGY AND PSYCHIATRY] in Chinese No 2, 23 Apr 85 pp 79-80

**TEST OF ENGLISH ABSTRACT:** This article presents the major psychotic symptoms of the affective disorders investigated for 122 cases. Of all the cases, 36.9 percent of the patients developed disorganized behavior, etc., while catatonic symptoms were not found. The major psychotic symptoms seen were mostly of the bipolar I and mania types. The diagnostic significance of the major psychotic symptoms presented in affective disorders is briefly discussed.

9717

CSO: 4009/249

AUTHOR: WANG Qifang [3769 0366 5364]  
NING Endi [1337 1869 1717]  
LI Jianmin [2621 0256 3046]

ORG: Tianjin No 1 Central Hospital, Tianjin

TITLE: "Observations on Use of Amino-acid Mixtures in Severe Burn Patients"

SOURCE: Beijing ZHONGHUA WAIKE ZAZHI [CHINESE JOURNAL OF SURGERY] in Chinese  
No 2, Feb 85 pp 69-71

TEXT OF ENGLISH ABSTRACT: Seventeen kinds of amino acids mixture (AAM) were used in 10 cases of severe burn patients from June 1983 to June 1984. All patients were cured.

The results showed that both total protein and albumin in plasma were remarkably increased ( $P<0.05$ ) after infusing AAM, but electrophoresis and lymph cell count showed no remarkable change.

In 4 of the 10 cases, positive nitrogen balance appeared respectively on the 47th, 30th, 19th and the 29th day after burn, the AAM-nitrogen infused during the first 14 days making up one half to one third of the total intake of nitrogen during the period. Urine nitrogen value was 22.4g/day between the 3rd day and the 21st day. Stool nitrogen value was 1.8g/day during the first 14 days. Nitrogen loss from the wound accounted for about 23.2% of the total nitrogen loss in the period.

Most free amino acids in plasma became lower than normal after burn. The branched-chain amino acids decreased 20~30% from their original levels. They all increased after infusing AAM.

But the PHE and PHE/TYR ratios were significantly elevated. As a whole it was observed the ratio is positively correlated with the severity of the patient's condition.

12949  
CSO: 4009/232

AUTHOR: HE Qingjia [0149 1987 0502]  
CHU Xiangao [0443 2009 7559]  
YAN Yongtong [7051 3057 1016]

ORG: Third Military Medical College, People's Liberation Army, Chongqing

TITLE: "Experimental Study on Burn, Blast and Combined Burn-Blast Injury"

SOURCE: Beijing ZHONGHUA WAIKE ZAZHI [CHINESE JOURNAL OF SURGERY] in Chinese  
No 2, 22 Feb 85 pp 87-89

TEXT OF ENGLISH ABSTRACT: Twenty-nine dogs were divided into three groups of burn (9 dogs), blast (10 dogs) and combined burn-blast injury (10 dogs) respectively. Visceral organs, especially the lung, heart and auditory organ were damaged in the blast injured animals. A moderate degree of lung damage was the main clinical manifestation. Most of the dogs had a stable clinical course and only one-tenth of dogs died. The clinical course of burned animals (15% full thickness flash burn) was similar to that of severe degree burn with relatively mild shock and prominent local and general infections. Six-ninths of burned dogs died from infections. In combined burn-blast injury group, the clinical characteristics and termination were similar to those of burned dogs, with blast injury manifested additionally in these animals. The infection was intensified to certain degree in this group of animals and infections were the chief cause of death in eight dogs.

12949

CSO: 4009/232

END

**END OF**

**FICHE**

**DATE FILMED**

01 AUG 85